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CONTENTS

Research in the Medical School.
Alfred Stengel 257

Normals in Training Methods for Clinical Specialization.
George H. Meeker 266

The Desirability of Teaching Bronchoscopy and Esophagoscopy to Undergraduates.
Louis H. Clerf 276

Anatomical Pedagogy and Features of a Revised Course.
Dudley J. Morton 280

Medical Genetics—An Essential Part of the Medical Curriculum from the Standpoint of Prevention.
Madge Thurlow Macklin 291

The Teaching of Neurology in the Preclinical Years.
A. R. Vonderahe 305

Program for 1933 Meeting 309
Editorials 311
College News 313
Personals 317
General News 318
Book Reviews 320

NEW TEXTS—just ready

New edition—HOWELL'S PHYSIOLOGY
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Continued on Third Cover Page

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Research in the Medical School*

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The term research, in the present day, has come to mean not so much scientific investigation in its broadest sense, which implies a study of facts by the most careful analysis, but, rather, the assembling and analysis of data obtained by objective methods. Such a limited application of the term would exclude historical, sociological, classical and psychological studies from inclusion under the designation of research, an obvious misinterpretation. Whatever I shall say on the subject of research, therefore, includes not only laboratory studies and objective research, but also scientific studies based on accurate investigation and analysis of data obtained by any means whatsoever. It would seem unnecessary to enlarge on or defend such a proposition if it were not a well known fact that many of our present-day scientists regard nothing as investigation unless it rests on laboratory or objective methods of study. The startling conclusions of men like Newton or Einstein, based on mathematical determinations, would be excluded from scientific investigation, and, more specifically in the medical sphere, Jenner's observations on vaccination, the early discoveries in the use of mercury in syphilis, iron in anemia and digitalis in cardiac diseases, would all be regarded as unworthy of consideration as contributions to scientific or investigative medicine.

As a matter of fact, we ought to recognize that carefully assembled data utilized in an accurate way constitute the essence of science, and that it does not matter how the facts are accumulated, whether in a cloister, a library or a laboratory. On the other hand, we must not ignore the equally important fact that medical science has been particularly advanced by methods of objective investigation, while the older methods have fallen short of yielding results of comparable significance. We cannot, therefore, properly justify any feeling of surprise or criticism when those who are engaged in laboratory investigation manifest a scornful attitude toward other methods of research. After all, it must be admitted that the major

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contributions to medical advance in the last quarter of a century, and the promise for the future, must be credited to objective laboratory investigation. It is, therefore, clear to my mind that a discussion of research in medical schools should have reference mainly to this type of research, though it would be unfair to exclude altogether clinical, statistical or literary researches, if the latter are equally surrounded with the accuracy of method which is demanded in the sciences generally.

A discussion of the importance of research in the medical school must, of necessity, be fragmentary in the brief time at my disposal, and I shall, therefore, content myself with touching on merely a few aspects of the question. Among these are: (1) To what extent is research a function of the medical school? (2) What effect has a research program on the teaching body of the school and on the quality of teaching? (3) How is the student body affected and to what extent should the students be actively engaged in research? (4) To what extent should research be carried with reference, especially, to the financial burdens which it involves?

1. One occasionally hears it said that the whole duty of the medical schools is to train young men and women for the vocation of medical practice; that the cultivation of research is not their proper function. It would hardly seem necessary to mention a fallacy so obvious as this if it were not for the fact that it finds expression even in these days of rapidly advancing medical discovery. Unjustified as this thought undoubtedly is, it receives a certain spurious support from studies of the mounting costs of medical education and from the fact that many of the major discoveries of modern medicine have been made outside the medical schools. In connection with this last statement it may, perhaps, be worth recalling that some of the keenest investigators have felt that the research work of institutes unconnected with medical schools might have been enhanced by a closer contact with medical teaching.

It is somewhat strange that a feeling of opposition to research in medical schools should at any time have found expression when we study the history of the earliest medical schools of our country, and find that the founders appreciated study and research as of equal importance with teaching. It is not out of place here to refer to the founder of the first American medical school, John Morgan, and to his "Discourse upon the Institution of Medical Schools in America."

Having spent five years in arduous study in England and on the Continent of Europe, and having published at Edinburgh a most notable thesis in which he anticipated by a century Cohnheim's discovery of the mechanism of pus formation, it need hardly excite surprise that in his proposal for the establishment of a medical school he emphasized the importance of in-

vestigation or research. The three men who later joined with him in the first medical faculty were men of similar training and ideals, men, who had likewise published theses representing worthy research and who supported him fully in his proposals. For many years following the establishment of this first school, and the other early schools which soon followed, the publication of a thesis representing some type of investigative study was a condition required for graduation, and among these early American theses a number could easily be cited to show that the investigative spirit was real and alive.

As time advanced and the character of population along the Atlantic seaboard, with its considerable opulence, was changed by growing immigration and a moving westward of people from the older settlements, the whole country changed somewhat rapidly, and it is not at all surprising that later-established schools in more remote sections, and even those in the original colonies, took on a different type. The American world was developing rapidly, and the more sedate character of the earlier settlements gave place to a new order of things. The conditions in the spreading country no longer encouraged the long European study of men who wished to qualify for medical careers. Shorter and more practical methods seemed better adapted to supply medical practitioners. The schools of the second period of American medicine were designed to fulfill this need. The day of student theses and prolonged study was a thing of the past. Under these conditions, it is not at all surprising that medical schools, having few requirements of equipment, multiplied, and that "diploma mills" of unsavory reputation flourished.

Even the best of the medical schools in the older centers degenerated as their competition with inferior ones made numbers of students rather than quality of teaching an influence of potency.

The awakening to better things must undoubtedly be attributed to the introduction of laboratory methods of investigation and teaching, and the quite modern notable improvement in medical schools to the realization that the medical sciences had grown to a stature that made them the real foundation stones of medical education.

If we are to judge fairly regarding the place of research in the medical school, we must reflect on the influence this movement has had on the medical schools during the last quarter century. Beginning about the middle of the last century, the influence of pathologic anatomy, mainly due to Virchow and the German school, supplanted the clinical methods and teachings of the French School of Laennec, Andral, Broussais, Louis and other eminent clinicians, and of the earlier clinical schools of England and Ireland. Pathologic anatomy and pathology laboratories began to

occupy a principal place in American as in European medicine. Experimental physiology, although it had already assumed considerable importance in certain European centers, was still of little significance to medical schools generally and did not, as a matter of fact, obtain its proper recognition until the era of the new science of bacteriology had somewhat run its earlier dramatic course.

In the meantime, physiology and biochemistry were moving nearer to the practical problems of medicine, and in recent years, in many respects, have gained ascendency over the older directions of medical investigation. Let me add that physics, with its extraordinary methods, bids fair to prove even more potent in the future than any of the other sciences.

In connection with this growth and development of the fundamental sciences, it is of very great significance that their applicability to the study of disease at the bedside has advanced so greatly that the whole trend of clinical investigation has received new direction. Instead of depending wholly on animal experimentation, the investigator of the present day is able to study the physiological and chemical features of disease directly at the bedside, and it should be noted that the clinical investigator, more than ever before, must be one who has an abundant training in one or more of the fundamental sciences.

Reviewing thus, briefly, what has happened in the development of medical study, it seems hardly worth while to say anything more in defense of the proposition that a medical school unconcerned with research work must be sterile, indeed, and lacking in all stimulus for its student body.

2. The teaching of medicine naturally requires that there shall be those who by long training and experience know the daily problems of the physician, and by abundant contact understand both the physical and psychologic conditions of the patient. It also requires of the teachers a knowledge of the fundamental medical sciences and a capacity to relate these to the practical problems of medical practice. It is, of course, obvious that both play a part in a medical school most of whose graduates will later engage in medical practice but some of whom will enter scientific fields.

A school set up on the proposition that the staff should be composed mainly of teachers of wide clinical experience without any considerable previous scientific training and no current interest in research would obviously prove an anacronism. One in which the predominating emphasis is placed on clinical teaching, and the teachers, however thoroughly trained by previous scientific experience, no longer feel interested in medical research, must inevitably fall behind the advances of the day. On the other hand, it seems equally certain that schools in which scientific inves-

tigation is stressed to the point of submerging all clinical studies must fail of its principal purpose, that of training young men for the vocation of medicine, however much the exceptional student headed for a scientific career might profit by the school's plan of operation.

The proper solution of the matter is that the clinical part of the teaching body should be recruited from those who have had fundamental training in the sciences of medicine, and though their present occupations may prevent further investigative activity of the laboratory sort, their point of view still remains as an inspiration for their staffs and from men deeply interested in the medical sciences without having altogether lost the appreciation that medical science in a medical school is an object to an end.

Unless both groups are themselves more or less engaged in research and have the additional stimulus of teaching students from this point of view, or, perhaps, of guiding students in research on their own part, the best element in modern medical teaching would be lost.

As is suggested here, the research program of a medical school does not so much require the participation of the student body in personal investigations as the constant presentation to the student's mind of the importance and methods of research. Abundant demonstration of actual research work and of the methods employed in research suffices for most of the student body, by subjecting it to the atmosphere of modern medicine. This is, perhaps, best accomplished in the courses on physiology, chemistry, pharmacology and experimental pathology in which methods play a larger part than in other branches, but it can be continued profitably throughout the whole curriculum, even to an extent in the clinical branches.

Aside from the direct effect of a research program on the medical student is its effect on the subordinate teaching body and on the whole school. We need but reflect on the eminence in past times of Padua and Paris, London, Dublin, Vienna and Berlin to appreciate how master minds and investigators drew to them not only students in great numbers, but pupils of great ability who later spread the knowledge of the masters and enlarged it on their own account. The influence of outstanding characters in every walk of life on those in contact with them is so well established that no discussion of it is necessary. We need but think of the great artists, the great literary figures, not to mention great scientists and philosophers surrounded by associates and pupils who rose to far higher levels by reason of these contacts than they otherwise could have risen. The medical school, like everything else, needs leadership, and in a profession advancing so rapidly along purely scientific lines it needs those who not only command the knowledge of yesterday but who are also engaged in advancing the columns of new discovery.

A proper proportion of research work distributed through the teaching body has another and very important beneficial effect on the teachers, that of drawing them more closely together and thus enabling them to appreciate more fully the respective problems which lie before them. This does not imply merely that those engaged in research in one field should have a better understanding of research in another, but more specifically that while research activities are to an extent, though to a varying degree, a function of all departments, those whose activities lie more nearly in the region of "pure science" should have a greater realization of the obligation of all teachers to devote a part of their energies to systematic teaching, and of the teachers in the clinical branches to give much time to the training of the student in clinical methods of observation and deduction. One need not go far to discover individuals highly capable in research who are scornful of other necessary parts of the work of a teacher in a medical school. Such attitudes are, perhaps, less frequent among the most highly qualified in investigative work, but the tendency is naturally greatest where research is set on one side among one group and other activities occupy too exclusively the interests of other groups.

3. The effect of a research program on the student body has already been discussed, but it must be considered from other angles. Much depends on the scope of research activities to which students are admitted and the significance which the teacher places on research in comparison with other medical studies. If it be forgotten that medicine involves a very extensive knowledge of facts concerning the clinical as well as scientific relations of human anatomy, physiology and pathology, and if undue emphasis is placed on those features only which are susceptible of demonstration by investigative methods, there must, of necessity, result a one-sided course of teaching that will fall short of a desirable curriculum.

This sort of over-emphasis on research, sometimes manifested in medical schools, may have had the effect of creating a spirit of antagonism, and where it might not be charged against the school as a whole, individual teachers have, on occasion, been responsible for giving the impression that nothing counts in medical study except that which grows out of a research attitude.

These undesirable tendencies are, however, not as common as the even less defensible point of view of those who maintain that all emphasis should be placed on purely clinical teaching and that research activities should be restricted considerably. The right answer lies in the observance of a proper balance between other studies and research, and the fault of over-emphasis may, perhaps, rest on the science teacher more than on the clinician. Though the latter, by lack of interest or training, fails to stress

the scientific aspects of his subject and the part which research has played in their development, he may, with some justification, hold that his sphere in teaching, being practical, is more largely concerned with the data of observation and with results of scientific studies rather than with the methods and processes by which they are established. If, on the other hand, the teacher of the scientific branches stresses only investigative efforts and occupies the largest part of the student's time in collecting, analyzing or obtaining research data, he will, undoubtedly, give a powerful impulse toward a research point of view, but he will so overburden the average or mediocre student as to deprive him of the time and energy to acquire the knowledge of the whole subject which every medical student should acquire. The exceptional student would acquire from such a course just the thing he needs, and by reason of his facility would not fail to acquire, in addition, a full knowledge of the content of the subject he is studying.

It is necessary to recognize that two, perhaps three, types of students must be considered in connection with research work. The mediocre student, by hard work devoted to all of the studies of a medical curriculum, will succeed in becoming an acceptable medical practitioner, and his exposure to the proper research activities in the medical school, though he took no personal part in them, will contribute to his greater acceptability. The average student, and it may, perhaps, be added, one who exhibits no special capacity for independent thinking, may receive a useful discipline and rise to higher levels by being assigned to a moderate participation in research activities. Only the exceptional man may profitably be allowed to pursue intensive research work as a medical student and to have exemptions from routine studies for the purpose.

Of course, one fears that such a course of action necessarily prevents the student from performing his other duties as a student acceptably, or from acquiring the general knowledge every student should possess, but my experience does not support this view. Exceptional students who have produced research work of a high order and requiring concentrated attention have repeatedly shown themselves to be far above the average in their general attainments, and it would seem entirely justified to grant such students extreme latitude to pursue special studies of a research character.

When we come to dealing with numbers or proportions of a student body, figures are of little value and only generalities count. My own belief is that at least a quarter of any medical class, selected with all care as to their previous education, will not have any spare time from routine studies to engage in any problems of research, and that more than another 50 per cent of the student body should with the former group receive their understanding of research work chiefly from the evidence of

its value and directions as the routine courses of study will indicate. To a distinctly limited extent, men of this group may profitably be allowed to assist in some research activities. The remaining selected quarter of the class may contain a small number of men so qualified by nature and previous training that they may wisely be encouraged to engage intensively in research, without justification of the criticism that they will be unable to perform their routine work as medical students.

The medical school which can find five students in a class worthy to be included in this last group would be fortunate, indeed, but having them would be censurable if it failed to extend to them every opportunity. Those in the upper quarter of a class, falling short of the qualifications of this very small selected group, should be dealt with as one deals with the middle group of average students, with, perhaps, slightly increased latitude.

We approach these matters somewhat differently from the manner in which Europe has done, and we are, perhaps, inclined to extend exceptional latitudes and opportunities where their longer experience, as well as their academic traditions, would withhold them. The average student in European schools has had the advantage, which, until somewhat recently, has been unusual in America, of receiving his whole instruction from men well qualified by long apprenticeship in the school of scientific as well as clinical training, but he has not been required or even permitted to have the opportunity of personal participation in advanced studies. By reason of more prolonged training for academic careers a not inconsiderable proportion of their students have followed their undergraduate studies by somewhat prolonged postgraduate courses looking to qualification for a higher post than that of practical physicians. The effort in America has been more largely in the direction of speeding the process and encouraging advanced studies in undergraduate days. My contention is that the American plan is not unjustified in the case of the selected exceptional student, but that we should sharply restrict such opportunities to those unquestionably qualified.

The whole matter is related, to a certain extent, with trends in education. The whole tendency in Europe is to give greater emphasis to primary and secondary education and thus prepare the student for professional studies. Moreover, the objectives of professional studies are definitely vocational. The exceptional man, seeking academic or other forms of higher qualification, pursues further postgraduate studies to qualify him for these exceptional positions. In America, without comparable preliminary education, we have been trying to advance men to the position of the European during his undergraduate career. Neither the European nor the American plan seems altogether right. Perhaps, they are wrong

in postponing intensive studies, and we may be wrong in advancing such studies too much to undergraduate days. The essence of the whole matter is how we shall best develop the most promising men for research careers without preventing the whole student body from obtaining the vocational education for which they entered the medical school.

The question of research in medical schools concerns this body very greatly because an extensive research program requires considerable financial support, and medical schools, fully aware of their responsibilities toward this branch of their proper work, will wish to determine how far they must strain their financial resources to hold a position among acceptable medical schools. Unless endowments are considerable, the liberal extension of research work becomes a too heavy burden, and any effort to maintain expensive research programs by increased costs of tuition is manifestly improper. A reasonable support of research activities is a proper responsibility of every medical school and may fairly be charged among the necessary costs of medical education. Tuition fees based on the costs thus arrived at are justified, but it would be unfair to raise the fees to higher and higher levels because ambitious research activities overburden the financial resources of the school.

The large budgets needed to sustain increasing research programs require no defense; but it should be recognized that the responsibility rests on the public, which is the direct beneficiary, and on the medical school for whose standing and greater glory research is encouraged. To assess the medical student for these benefits, is manifestly improper.

We all recognize that tuition fees, high as they are, fall far short of meeting the total costs of a medical education, and if the demands for larger staffs, more ample equipments and, in consequence, increased budgets continue to grow, the discrepancy between income from tuition fees and expenditure will become still more marked. In that case it may well be doubted whether the interests of medical education will be served properly by increasing the fees.

The total expenditure for medical education in time and money has now reached a level which cannot safely be exceeded, so far as the great majority of students, that is those studying for a medical vocation, are concerned. Those seeking academic or scientific careers may, with propriety, be expected to extend the time of study but will generally require the aid of scholarships, fellowships, and the like, to lighten the financial burden. It is the duty of those who are in administrative charge of medical schools to educate the public to a feeling of responsibility even beyond that which has been manifested in the past. A more concentrated, continued and cooperative effort of this sort by all the schools acting through an Association such as this should prove most effective.

Normals in Training Methods for Clinical Specialization*

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Herein, the effort is to state, at least approximately, in a definite and normal form a medical educational necessity which has remained inchoate or rudimentary too long. The method employed is to point out those forces which lie latent in the materials of the problem; and to indicate how they may be employed to solve it. In broadest manner, the problem may be stated by the question: What, in America today, is a normal, systematic, general educational procedure qualified to lay in one such a foundation of special knowledge and skill as he needs if he is to become expert in a clinical field? Narrower statements of the problem will become obvious from the context; but one of them is given in the titling of this paper.

In proceeding, it is deemed necessary, from time to time, to define, either explicitly or implicitly, certain well known medical terms and matters which are essential to the argument. This is so because, while well known, they are commonly so vaguely or variously understood that the herein argument could not clearly proceed without clear expression or implication of the meanings.

The major conclusions finally indicated are: (a) that every expert clinician is a clinical specialist, and must have in some manner become trained so to be, subsequently to his standardized training to the point of his licensure; (b) that for such special training there should be available some normal graduate educational plan as clear cut, generally accepted and effective as the conventional plan of undergraduate medical education; (c) that such a plan requires normally organized cooperation between academic, hospital and clinician elements; and (d) that the plan outlined is competent in the premises.

Fundamentally, it is the right of the patient to receive the best medical service that contemporary medical knowledge, skill and organization are potentially capable of rendering to him. In critically studying some essentials toward the rendering of such a quality of medical service, let us consider patients collectively, rather than individually, since the necessary service arrangements, to be efficient, must provide for all patients, and hence can provide for each patient, whether he needs the benefits of the service arrangements in a small way or in a large way. As an analogy, we should look at medical service arrangements as we look at public util-

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ity service arrangements—in which the service arrangements are designed to care for peak service loads and maximum efficiencies and, hence, can serve efficiently all loads, however small or large they may be.

With the foregoing in mind, it may be said at once that the patient cannot receive the stated medical service except through the combined benefits of first class hospitals and first class clinicians; and the present study limits itself to the clinician element.

A clinical specialist is a clinician who makes no pretense of being qualified to render all types of clinical service, but who limits his service to a field in which he is presumed to be qualified as an expert.

Such is the great magnitude of present day medical knowledge that it is beyond human possibility for any one person to be expert in all or, indeed, in more than a minor portion of it. This fact is also true of clinically applied medical knowledge. Furthermore, the clinician, in addition to due knowledge and facilities, needs to have the benefit of large clinical experience which can only be obtained so slowly and so painstakingly that one person's lifetime and life effort suffice in a limited clinical field only. All of which is equivalent to saying that a competent clinician is necessarily a clinical specialist; and that it is futile to attempt to train clinicians except for special clinical fields.

To say that one person cannot be an expert in all clinical fields is by no means the same as saying that he cannot possess a good foundation of knowledge in all clinical fields. On the contrary, one cannot be a true expert in any clinical field without due fundamental equipment in all medical fields, clinical and scientific. No structure can be dependable without adequate foundation; and this is just as true of a structure fitted for clinical service as of a structure adequate for any service.

Therefore, the due training of all clinicians is essentially the same with regard to the main foundation or footings thereof. This foundation begins with the preparatory medical studies; and is fully completed only when one has become legally qualified to begin clinical service as that kind of a clinical specialist called a "general practitioner."

The assertion that the "general practitioner" is a clinical specialist is justified by the fact that if he confines himself to that field in which, normally, he should and can become expert, he will practice internal medicine. However, the "general practitioner," when he begins his practice, is merely "legally" qualified. This does the patient some good; but it does not furnish him with an expert clinical service; and such a service he cannot enjoy from the "general practitioner" until the latter becomes an expert in internal medicine. In other words, the "general practitioner" needs special training parallel to that needed for any other kind of clinical specialization.

Considering the audience, there is no need to define the fundamental, but limited, clinical field called internal medicine. However, it is in order to discuss somewhat the two types of such special practice. Much unnecessary confusion of thought exists because the first type is named by the archaic and misleading expression, "general practice." Once upon a time that expression was up-to-date and descriptive; but that was a time when clinical knowledge and opportunities were so restricted that one clinician could, and many clinicians did, compass efficiently the whole field —and that time has long passed in America, save in those rare locations wherein modern clinical service is denied because community hospitals and their staffs are too remote, despite electrical communications, highways, automobiles, railways and airways.

The co-type internal medicine practitioner is usually called an "internist." To avoid confusion, let us hereafter term the so-called "general practitioner" simply "physician;" and retain the expression "internist" for his co-type.

It is a fact, which should be admitted, that all efficient clinicians are clinical specialists; that all should first become specialists in internal medicine, as physicians or as internists; and that the training for other clinical specialization should be based upon due foundation in internal medicine. Granted one such a foundation, to the licensure, or "general practitioner" stage, our problem becomes to define normals for further training toward physician-internist stage; or surgeon stage; etc.

The normal is not necessarily the ideal and, presumably, cannot so be. The normal gets us as near to the ideal as under limiting current conditions it is practicable to go; but the nearness attained has the desired practical merit. It requires good judgment to fix on a proper normal; and having once defined a normal, the effort is always toward refinement of the definition. To take a physical example: we need an ideal measure of length, but have none. However, we do have as useful normal measures, the legally defined yard and meter and their normal legally defined ratio to each other. Here the normal is exceptionally near to the ideal.

When we consider matters medical it commonly happens that the nearness of the normal to the ideal is not pronounced; but it is far better to define and accept a useful normal which gets us to a valuable result, than to wander about, vaguely, insularly and ineffectively, because we refuse a useful normal while futilely questing the ideal.

The real value of a normal appears only when it becomes generally accepted; and generally used and so continues until a better normal supplants it. Under such acceptance and use each one actively at interest understands the others' expressed ideas; and there result those unitedly directed efforts, without which all efforts are of minimal effectiveness.

It is normal for a patient to receive the best medical service that contemporary medical knowledge, skill and organization are potentially capable of rendering him; and it is normal that he get this service via competent clinical specialists and modern clinical facilities: but controlling such service are three interdependent factors. It is necessary to have all of these factors operating conjointly if the stated patient service is to be available. Two of these factors are the supply of normal clinicians and of normal facilities; and the third is to defray the normal costs involved in the whole matter.

While herein the concern is with the clinician factor, yet it must be recognized that the other stated factors are essential to a single whole and should here receive enough comment to indicate that they are attainable.

It is submitted that it is just as much a matter of public duty to ensure the existence and maintenance of adequate hospitals as to ensure adequate public health and public education programs. The fact that many hospitals are private institutions is no negation—being parallel, for example, with the fact that many municipal water supplies and many schools are private affairs. Just how the public ensures adequate water supplies and schools we need not, here, say—nor how the public is to ensure adequate hospitals. It is plainly a public responsibility and a public necessity.

It is submitted that the cost of medical care is partly a public responsibility and partly a private one—according to circumstances. Surely, it is in no part the obligation of clinicians. Although, to an admirable degree, clinicians have contributed unpaid services, such services are really entitled to large reward. This reward should accrue from salaries for services to the indigent; and from adequate fees for services to others. Insofar as necessary, medical care insurance should here enter the picture—no part of such insurance benefits accruing to the insured; but rather to those who render the medical care.

Having outlined what is normal for the patient, for the public in the patient's interest, and for the due reward of the clinician, one may return to the study of what is normal in the training of the various kinds of clinicians necessary in the premises.

There is need to do no more than make certain comments on the clinician's earlier medical training. In America, the normals, usually called "standards," for such training are well established and generally used. They provide for his general, premedical, undergraduate medical and preliminary postgraduate medical training, general certification and state licensure.

While much of said training is not directly clinical, it is all, properly,

converged toward a special clinical goal—which goal is that he shall have become, as nearly as possible, qualified to practice internal medicine as a "physician" in the herein sense.

Perhaps, it will be objected that the physician practices more than internal medicine—obstetrics, pediatrics, surgery, anything. Such objection does not apply—for the herein whole discussion hinges on expertness in clinical service; and, of the matters concerned, the physician, if expert in anything, is expert in internal medicine only. Of course, his broad underlying medical education has made him familiar with the major theory of all clinical fields. If that were not so, he could not be expert in any clinical field—and especially in internal medicine. Furthermore, as a part of his training he also would have enjoyed worthwhile general clinical contacts, especially during his preliminary postgraduate studies as a hospital intern. It is not that he does not know something of value in all clinical fields. It is simply that if he is an expert at all, he is so in the stated field only.

The objection that he is not yet an expert even in internal medicine, if made, would hold, but would be captious. The facts are that he has had a normal training toward that clinical goal; that all of the normal authorities concerned have approved him as a normal beginner in the practice of internal medicine; and that he may properly begin to practice as a physician and normally progress to real expertness. Unwarranted pretension is quackery; but there is no such element here. The normal here is relatively remote from the ideal; but is normal because it is safe and valuable and is the nearest approach currently and economically possible.

Study of the true physician in his practice discloses that when he renders clinical service outside the field of internal medicine, he does so only to the extent that his general clinical knowledge warrants. He always stops at the point when, in his sincere judgment, another kind of expert clinical service is indicated—especially such other kind of expert clinical service as can most efficiently be rendered under the benefit of proper hospital facilities. For example, care of patients in pregnancy and childbirth is one of the physician's mainstays. Usually, his is the only clinical service needed or rendered; but when obstetric emergencies arise, in which only an obstetric expert is fitted to serve, the physician calls on such service.

The physician should be as expert in internal medicine as the internist should be. So far as vocational service is concerned, the essential difference between the internist and the physician is that the internist confines himself mainly to internal medicine, to consultations and to office and hospital practice; whereas the physician, while acting as an expert in internal medicine, acts broadly in the medical welfare of his patients, rendering an essentially personal service—in family, home, office and hospital.

One major medical service is normal to the physician, one which is commonly neglected. All of his patients need his continuous expert medical management for personal preventive medicine, for general medical counsel, and while they are temporarily under the care of other types of clinicians. Such service the physician, of course, cannot render if he is unfitted for it, or if it is refused by his patient; but it is of such prime importance to both patient and physician that every possible effort should be exerted to promote it.

Since every clinician should be expert in his chosen clinical service field, since the beginner physician is expert in no clinical field, and since it is impossible for him to become expert in all clinical fields, it is clear that every beginner physician needs further training toward expertness in some field; that he should determine which field; that he should strive toward expertness therein, and that in the proper interest of both patient and clinician there should be available efficient plans and facilities for such striving.

There is no single pathway which a physician must tread until he has become a normal clinical specialist; and herein is no thought or attempt to describe such a single pathway. The thought is rather to describe a normal pathway that those who choose may safely follow; that all may use as a measure, and toward which all efforts are likely gradually to converge.

It is a fact that whereas one might become qualified (not in a legal sense) as a beginner physician by various means, that actually there is only one pathway now employed and that is the normal, or standard, pathway toward licensure as above indicated. It should not be forgotten that this was not always the case; and that, in fact, it is comparatively a recent development. We need only return to the eighteen-seventies to find a wholly different status, in which there was no established normal. Furthermore, the present normal began to emerge only in the present century.

One cannot say that there were not deviously produced in those earlier days clinicians wholly competent to render medical services which reflected the potentialities of the then store of medical knowledge; or that there were not giants among those so produced. But who now would have us abandon our present normal system and return to the former inchoate conditions? We would still have our present day medical knowledge; but we recoil from the thought of communicating, continuing and developing that knowledge, except along our present systematic lines. Doubtless, the system will alter; but it will remain systematic.

What is here urged is that the time has arrived when it is quite as necessary to establish some approved system for continuing the foregoing

training to the point of clinical expertness; and it is further urged that the following plan is a normal one.

1. Let the physician begin with a first functional period of training, consisting of private practice as a physician during preferably three, but not less than two nor more than five years. This might be called the period of independent primary clinical experience.

2. Let him then engage in a second functional training period in a university, wherein he would devote himself for at least one year to systematic studies of the theory and practice of the clinical specialty which is his goal, together with the theory and practice of the fundamental medical sciences from the standpoint of their clear applications to the clinical specialty concerned. This might be called the period of academic special clinical training.

3. Let him then engage in a third functional training period, during one or two years devoted mainly to adequate clinical experience within the special field, and partially to clinical research therein—all under approved preceptorial control. This might be called the period of special clinical precepteeship.

4. Let him then demonstrate that he is qualified to become approved for practice of the specialty concerned by a national board which has had authority to bestow such approval conferred on it by the organized practitioners of the specialty. This might be called the formal act of certification of fitness to begin special practice.

5. Thereafter, let him engage in the private practice of his clinical specialty—in which he should grow to full maturity within approximately three years; and when aged about 35 years. He would, then, have, let us say, the expectation of about twenty-five years of special clinical practice as an expert—provided he continued, with enthusiasm and studiousness to grow in expertness and to keep in step with the advances in his field. This might be called the period of independent special clinical practice.

So many reasons lie behind the items of the program just stated that due limits for the present paper do not permit full discussion. However, some discussion herein is essential.

The purpose of the first named functional training period should be plain to any clinician. In this period the physician acquires a needed degree of clinical maturity and self-reliance. In all of his previous training he has been under orders in an institutional atmosphere, but in this period both he and his patient must rely on himself alone, in home, field and office atmosphere. Furthermore, since practically all clinical practice has a livelihood background, and since the further items of the stated program are expensive, it will, in most cases, be only those naturally qualified for

success who will during this first functional period make it possible for themselves to complete the whole program.

As matters stand today this, normally first, functional period of independent primary clinical experience is largely discouraged. The tendency of those just completing internships is to strive to avoid a period of private practice as a physician; and to begin at once to fit themselves as clinical specialists by the cheaper and less complete method of special residentships alone. In this they are aided by hospital authorities who unwisely, we believe, prefer them to the more mature and systematically better prepared type indicated.

The purpose of the second functional period of academic special clinical training is essentially to provide that portion of the normal training which is not duly obtainable in any other manner; and to provide it in its proper place in the whole sequence. During undergraduate medical student days, both medical science and clinical studies are pursued from a broad viewpoint which cannot and should not emphasize numerous details which are essential to the training of the expert. Furthermore, many of such vital details do not appear as study opportunities in special assistantships and residentships; and those which do appear therein do so in that educationally diverse and casual manner, which is inherent therein, rather than under the influence of that orderly, systematic and consciously educational effort which is inherent in the academic method.

There is no question here of choice or of conflict between two methods. The only question is that of inclusion of both methods—of completeness —of omitting no one of the complements which are the logical parts of a duly finished whole.

One could become a physician without the aid of a medical school. Formerly some did that; but, happily, it is not done any longer. One could become a clinical specialist without the aid of a graduate medical school. This is still largely done; but it can be done much better with such aid, which is normal.

The third functional training period of special clinical precepteeship may normally occur in several ways. However, these ways all have certain features in common. One common feature is that all or a portion of the training must occur in a hospital, because nowhere else do all of the necessary facilities exist. Another common feature is that the trainee must have a suitable amount of intimate and responsible special clinical experience. Mere presence, devoid of personal experience and responsibility, is of value; but, alone is inadequate. Another common feature is that between the preceptee and one or more clinical experts in the chosen field, there must become established to an adequate degree the master and ap-

prentice relationship. A final common feature is that both master and apprentice shall have an active joint interest in clinical research in the field concerned.

The several ways in which the third functional training period may proceed are: special hospital residentships; special hospital visiting assistantships; and private special clinical assistantships combined with special hospital visiting assistantships. The foregoing embrace varieties termed clinical fellowships. The expression "precepteeship" has conveniently and descriptively been employed herein as an all inclusive term.

It is a characteristic of the normals here advocated that the preceptee would come into his precepteeship duly matured and prepared for its responsibilities and opportunities. He is no immature and partially prepared intern who simply steps directly from his internship into his special clinical precepteeship.

It is urged that this characteristic is in the interests of all concerned: of the hospital, of the patients concerned, of the preceptor, of the preceptee and for the precepteeship results which are sought. It does not reflect conditions now commonly maintaining; but it can come to do so; and probably will come to do so as soon as the truth becomes generally appreciated that in training for clinical specialization something more is needed than is to be found in hospital house-staff activities and facilities alone. Even though a reasonable maturing period of independent primary clinical experience be waived, a due period of special studies by the academic method seems to be quite as logical in graduate medical education as in undergraduate medical education.

The normal academic and precepteeship functional training periods should proceed on a cooperative plan between those controlling precepteeships and the academic authorities concerned. Such cooperation is in successful operation to a limited degree, at the present time. What is needed is that it shall become generally recognized as a true normal in the premises and become the common practice. The cooperation concerned requires for its conduction a normal mechanism. Such a mechanism has been devised and is in operation, but space and time forbid its description here.

If it be agreed that all clinicians should be experts in their several fields of clinical service, and that such expertness requires special training beyond the licensure stage, it follows that a very heavy and exacting traffic demand for such special training is faced.

This demand is too important, alike to patients and beginner physicians, to remain in its present disjointed, inchoate status. This demand should be met—in quality, quantity, availability and definiteness—by normal plans capable of producing a traffic status in graduate medical edu-

cation as satisfactory in the stated respects as is the present traffic status in medical education to the licensure stage.

Whatever may come to be accepted as normal plans in the premises, they must include that wide and efficient academic precepteeship cooperation, which is the crux of the matter.

From the precepteeship standpoint, the potentialities are so satisfactory that it would be comparatively easy to achieve large results if due understanding and willingness entered the picture. From the academic standpoint greater difficulties are faced; because the academic facilities indicated are currently so largely engaged by the undergraduate medical educational traffic, that there remain insufficient provisions for this newer and heavy traffic. Only a minor portion of the demands are now being served; and in large part permissively rather than by that conscious, systematic and serious effort which characterizes the undergraduate medical educational service.

The Desirability of Teaching Bronchoscopy and Esophagoscopy to Undergraduates*

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Believing that it is the function of the undergraduate medical school to produce general practitioners of the highest type, and that adherence to fundamentals in teaching is necessary to accomplish this, I wish to discuss the desirability of providing instruction in bronchoscopy and esophagoscopy for the undergraduate student as an aid in attaining this end. In presenting this proposition, I realize that one must have the courage of one's convictions to suggest to an audience composed of deans of medical colleges that additional studies should be added to a curriculum already overcrowded. I am not unmindful that it is the prerogative of every teacher to be impressed with the importance of his subject and his need for additional hours and greater facilities. I also am aware that the dean stands as a barrier or protector between the overworked medical student and the enthusiastic teacher, and that he is sympathetic with the general policy to decrease rather than to increase the number of hours devoted to instruction.

Esophagoscopy, laryngoscopy and bronchoscopy, preferably designated by the all inclusive term, peroral endoscopy, is a new art in the field of medicine. The practitioners of this specialty were formerly recruited from the field of laryngology, of which it was considered an offshoot. Originally designed and perfected for the removal of foreign bodies from the air and food passages, its field was limited. It was looked on by many of the profession as a curiosity. This view has not been corrected entirely for there still remain some in our ranks who consider foreign bodies in the same light as the physician of forty-five years ago regarded the new disease, appendicitis. A more general appreciation of peroral endoscopy has shown that its use is not limited simply to inspection of the air or food passages as the terms esophagoscopy, laryngoscopy and bronchoscopy might indicate. In trained hands, its importance in diagnosis and treatment has resulted in an increase of its use by the clinician and surgeon. The scope of its uses has exceeded the original limits, so that its relation to certain fields of medicine and surgery should be considered as being on a par with roentgenology.

If it is agreed that fundamental principles are important in undergraduate teaching, provision should be made to include in the curriculum

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instruction concerning aids in diagnosis and treatment that are based on direct or objective methods. Peroral endoscopy, as a diagnostic measure, is very largely dependent on the information secured by direct visual means, and it can safely be stated that in many conditions it is the final arbiter in diagnosis. Often, it represents the only available method by which direct treatment can be carried out.

It may be of interest to quote statistical data bearing on the frequency with which these procedures are employed. During 1922, when there were but two bronchoscopic clinics in Philadelphia, a total of 842 endoscopic procedures were performed in the Jefferson Hospital. About 12 per cent of these were foreign body cases. For the year 1931, when at least 13 bronchoscopic clinics were actively functioning in as many hospitals in this city, 3,545 endoscopic procedures were carried out at the same institution. Approximately 2 per cent of these were performed for foreign bodies. The obvious conclusion to be drawn from this is that there has been an enormous increase in the number of patients referred to the endoscopist for diagnosis and treatment. It should also suggest that any method so frequently utilized is worthy of general recognition and should be brought to the attention of the undergraduate student. This increase in the use of peroral endoscopy is not entirely the result of instruction given to undergraduate students concerning its field of usefulness; to my knowledge systematic instruction in this subject is given in few medical schools at the present time.

A common argument in favor of the exclusion of peroral endoscopy from the undergraduate curriculum is that the subject is one for postgraduate instruction. The technical skill required to practice the art can be acquired only by postgraduate study. The general application of this method in clinical medicine, however, is basic and every practitioner of medicine should be familiar with it.

Prior to the use of esophagoscopy, the diagnosis of diseases of the esophagus was commonly made on inferential data secured very largely by blind methods of examination. With the information secured by direct examination, it was found that much of our knowledge of the esophagus was erroneous. Esophagoscopy and roentgenology have placed the diagnosis of esophageal disease on a scientific plane which cannot be excelled in any department of medicine.

In the field of treatment, marked progress has been made. Many of the devices formerly used have been relegated to the museum. The probang and coin catcher, useful in their day as aids in the removal of foreign bodies, have been replaced by a more humane and scientific method which permits of removal of foreign objects under visual guidance. The treat-

ment of esophageal disease is largely of a mechanical nature and commonly requires direct endoscopic measures.

Equally important are the contributions of laryngoscopy and bronchoscopy. Indirect methods of examination of the larynx are applicable only in the adolescent and in the adult. With the use of direct means, it is now possible to examine the larynges of infants and children. The benefits derived from this are obvious. Bronchoscopy has added to the sum total of knowledge concerning the physiology of the tracheobronchial tree. It has contributed additional information concerning obstructive emphysema and atelectasis and the interpretation of certain physical signs. In diagnosis, it has become a valuable aid to the internist and is exceeded in importance only by roentgenology.

As an example of this may be cited the outstanding contribution made by bronchoscopy in the diagnosis of bronchial carcinoma. Everyone can remember when the diagnosis of carcinoma of the bronchus was commonly made by the pathologist in the autopsy room. Diagnosis in the living was usually made late and at a time when the case was hopeless. Today, many of these patients are well because the condition is recognized and accurately diagnosed during the early stages of the disease. Time does not permit of a detailed account of the contributions made by bronchoscopy in bronchiectasis, bronchial asthma, postoperative pulmonary atelectasis, pulmonary abscess, tuberculosis and many obscure chest conditions.

No chapter in modern medicine is more interesting than that contributed by peroral endoscopy to our knowledge of the symptomatology pathology, diagnosis, prognosis and treatment of foreign bodies in the air and food passages.

I believe that it is now a generally accepted fact that no chest department is complete without having access to bronchoscopic assistance, and that esophagoscopy is indispensable in the diagnosis and treatment of esophageal disease. The treatment of foreign bodies in the air and food passages is essentially a problem for the endoscopist. It would seem that a recital of additional evidence is unnecessary in advocating that the undergraduate student should receive some instruction concerning a method which occupies such a prominent position in diagnosis and treatment of diseases of the air passages and the esophagus. The place, then, for peroral endoscopy should be one that enjoys reciprocal relations with both medicine and surgery, in so far as it affects their respective fields.

Is the subject now being taught properly by the departments of medicine and surgery? When one finds that recent graduates in medicine are not familiar with the diagnosis, prognosis and treatment of foreign bodies in the air and food passages; when they are not aware that bronchoscopy

is employed in the diagnosis and treatment of many pulmonary diseases, or that esophagoscopy is a practical scientific method of diagnosis and the only direct method of treatment of esophageal diseases, one may infer that the subject is either not being taught or is insufficiently emphasized in some medical schools. Failure to impart this information to the student suggests either a lack of knowledge or of interest. This, I believe, can best be remedied by assigning this phase of teaching to one familiar with the methods in question. Instruction should be devoted to a consideration of the pathology, symptomatology, diagnosis, prognosis and general principles of treatment. The extent of this can be determined in correlation with the medical and surgical departments to avoid repetition. While certain phases of this subject could best be presented by didactic lectures, it would seem desirable to devote a great part of the allotted time to clinical or ward teaching.

In conclusion, I believe that peroral endoscopy is based on sound general medical and surgical principles; that it is commonly employed in the field of medicine and has assumed an important place in diagnosis and treatment. A conception of its general application in disease should be common medical knowledge. This can best be accomplished by including it in the curriculum of the medical school so that it may be taught to the undergraduate student. I do not favor its inclusion as an elective subject.

The technical application of the art of peroral endoscopy is a subject for postgraduate instruction and has no place in undergraduate teaching. The undergraduate should be impressed that skill in this field can be gained only after long study and preparation following graduation and internship in a general hospital.

Anatomical Pedagogy and Features of a Revised Course

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I

The notable advances attained in scientific medicine during recent years have inevitably necessitated changes in the teaching offered by medical schools. Rapid expansion of major subjects, and adoption of newly developed courses in specialized fields, have required broad curricular readjustments as well as revisions within departments in their plan of teaching. All subjects, fundamental and clinical, have been affected by these developments. Almost invariably they have been enlarged and have been granted a proportionate increase in curricular time, with a single major exception—subject of gross anatomy.

Fifty years ago, the entire course of training in medical school was completed in two years. Anatomy was taught during both years. Then, during the first half of this interval, the medical course was lengthened from two to four years. Anatomy, still occupying the first two years, was given many additional hours which enabled it to gain a predominant position among the fundamental subjects. As the first subject to acquire modern proportions, its position became notably conspicuous in the curriculum. During the subsequent twenty-five years, however, anatomy has been compelled to yield gradually to the advance of other subjects. The course which formerly extended through two years is now very generally being restricted to the first year only.

Despite the obvious importance of anatomy as a fundamental subject, the enlarged number and increasing importance of other subjects furnish ample justification for so radical a cut, providing, of course, that it does not jeopardize the medical student's fundamental preparation in this subject for his more advanced work.

The outcome has been to effect distinct modifications in the teaching of anatomy. The following two elements most strongly characterize these modifications: (1) correlation of basic morphologic studies with developmental, physiologic and clinical considerations, and (2) recognition of the fact that mastery of a subject can be acquired only through the students' own efforts, the rôle of the teacher being essentially one of guidance.

Because in almost all instances the changes in the curriculum have been gradual, it is quite natural that attention has been turned chiefly to isolated points of modification in the effort to compensate for relatively minor losses in teaching time. But when, over a period of years, that loss in

time has accumulated to the extent of becoming a radical reduction, the situation seems to call for a more deliberate and critical analysis of the plan of teaching in all its phases.

THE PEDAGOGIC PROBLEM. Every department of a medical school is faced with its own peculiar teaching problems induced primarily by the character and amount of knowledge which it is expected to impart. Moreover, there is a fundamental difference between the pedagogy of the first and second halves of the medical course. The first two years are concerned chiefly with accumulation of facts; the last two years, with application of those facts. Thus, in the first year the students are confronted with facts pertaining to the normal organism—anatomic, histologic, biochemical and physiologic facts. These are followed in the second year by facts pertaining to the abnormal—pathologic, bacteriologic and pharmacologic facts. The third and fourth years are passed in learning the intelligent application of the factual knowledge already accumulated and mastered, as it pertains to the diagnosis and treatment of disease and other abnormalities.

A second difference which directly affects the pedagogic scheme is found in the student personnel of the lower and upper classes. Newcomers to a medical school, though comprising a highly intelligent group, are, as a whole, young and immature, with a background of youthful irresponsibility and none too well trained in efficient methods of study. After two years passed in an atmosphere of serious professional activity and under the unrelenting stress of rigid curricular requirements, they enter the upper classes as matured individuals, confirmed in seriousness of purpose, and greatly improved in methods and habits of study. This difference in student personnel may not always be realized by faculty members who have contact with upper-class men only, but it constitutes an important phase in the pedagogic problem, particularly as it applies to the teaching in the first year.

In fact, the first year in medical school may be regarded as the real transitional period for these young people, because it is then that the desirable "graduate attitude" becomes a reality in the group as a whole. Its attainment cannot arbitrarily be presumed to occur at any particular time; for comprising, as it does, qualities of comprehension and reliability, the quickness with which this characteristic may be attained depends primarily on the individuality of each student. However, other factors which promote the whole-hearted and undistracted attention of the student to his scholastic work play a helpful part toward earlier development of this graduate attitude; and the promotion of a student to the second year class can, in a general way, be taken to indicate that he has more or less suc-

cessfully accomplished this important step toward mature thought and action.

II.

The pedagogic problem, applied to gross anatomy, presents four distinct phases: (1) content of subject matter; (2) capabilities of the student body; (3) mode of presentation; and (4) staff activity. The following interpretation of these phases is offered in explanation of the plan of instruction which has been developed and used for the past five years at Columbia University, College of Physicians and Surgeons, in a one-year course of anatomy consisting of 360 hours.

SUBJECT MATTER. No one who is familiar with the usual textbooks of anatomy will deny the vastness of the range of morphologic facts and the extreme complexity of detail contained in this subject. Its various subdivisions, under the headings of osteology, myology, syndesmology, splanchnology, angiology and neurology, embody descriptions of all the human structures carried to the smallest detail. When official mandate shortens the length of curricular time allowed for teaching so fundamental and extensive a subject, the action does not produce a shrinkage in the amount of morphologic facts actually contained in the text; it merely lessens the number of facts which can be presented and assimilated in the reduced amount of time. Consequently, such a change imposes, first of all, a careful revision of subject matter whereby the increased practical quality of the matter selected will compensate as fully as possible for the reduction in quantity. This revision of subject matter is obviously a function of the staff, and as a basis for selection, practical value toward ultimate clinical purposes must take precedence over academic interest. Also, the results should satisfactorily cover the entire morphologic range of anatomy.

Recent innovations, which have introduced greater use of developmental, physiologic and clinical considerations into the teaching of anatomy, are very desirable features, in that they contribute action and purpose to what was formerly a very static and gravid subject. But there is a limit to which these phases can properly be employed without further encroaching on the time that must be given to basic morphologic content. Physiologic or clinical significance cannot serve as substitutes for morphology; and, therefore, when the time factor is of serious concern, the use of these features should not be carried beyond the point where they are employed most advantageously in giving better understanding of structure and in stimulating interest in the basic morphologic facts.

In connection with subject matter one other factor merits consideration. The beginner's knowledge of anatomy cannot advance more rapidly than is permitted by his ability to acquire the use of anatomic nomenclature. He literally must learn a new language, in addition to mastering a

formidable subject. Although this difficulty is progressively overcome as the course proceeds, it is distinctly a retarding factor throughout the earlier portion of the course and impedes early orientation of the students in the subject.

Capabilities of the Student Body. Medical students form a highly selected group, judged by the rigid entrance requirements, and by the limited number who are admitted—limited, when compared with the total number of applicants. Nevertheless, the great majority of the entering class comprises, as has already been said, a group of immature, though intelligent, individuals entering the threshold of adult life with a background of youthful lack of responsibility, and imperfectly trained in habits of study. Moreover, while they may have had a premedical course in zoology which has given them an introductory insight into general biologic principles, they are as ignorant of the extensive details of human morphology as the average intelligent layman. They approach the course in anatomy as complete novices, with a total lack of experience in the work which they are about to undertake.

As an asset, however, they bring with them an earnest, even enthusiastic, ambition to be successful in the profession they have chosen. One of the most important factors for successful pedagogy is to sustain this active interest by maintaining a careful balance between the amount of work assigned and the capabilities of the students. Success in mastering the work which is expected of them gives confidence to students, promotes their interest, and increases the effectiveness of their subsequent efforts. Crowding of work, or involving students in a mass of detail beyond their powers of assimilation, leads to discouragement, loss of interest and impairment of effort.

It is equally important, for the sake of the students' ultimate command of the subject and their mental training in general, to develop in them efficient methods of study and a true judgment of relative values. When left to their own devices, they can easily become lost in the maze of detail and their most earnest efforts be rewarded only by negligible results. With the enthusiasm of inexperience, they devote themselves energetically to the study of detail and almost completely ignore the major and more obvious phases of the subject. Dissection tends to be regarded not so much a means of exposing anatomic structures for visual study as preliminary practice in surgical technique. Also, through lack of experience in dissection, students are often tempted to engage in difficult exposure of certain structures which have incidently caught their attention, thereby consuming time out of all proportion to any benefit that might result from the labor.

Such observations indicate that efficient effort cannot originate spon-

taneously in the majority of students during their first survey of a subject as complex and extensive as the human organism. Hence, in order that students may assimilate the greatest range of morphologic facts in an orderly manner and with a due sense of values, there must be adequate guidance. The lack of a concrete plan of procedure in study and dissection places the students at a marked disadvantage, and jeopardizes not only their morale but the results of their most earnest endeavors. On the other hand, proper guidance during the first year assures to the students steady progress wherein they can acquire increasing confidence and efficiency as they proceed.

Mode of Presentation. The older scheme of teaching was essentially didactic, with formal lectures on the systems of the human body conducted quite independently of the work performed in the laboratory. These lectures gave detailed consideration to structures of which beginning students had little, if any, knowledge, and were filled with anatomic terms which they did not understand. The success of earlier eminent teachers in anatomy is not to be denied; but this may be attributed more to the liberal amount of time granted for the presentation of the subject than to any real pedagogic merit in the method of teaching. As long as the two-year course was maintained, the first year could be regarded as a preparatory period which insured efficient and comprehensive work in the second year, during which most of the work was repeated.

When gradual reduction in curricular time deprived departments of anatomy of the original two-year course, the effectiveness of the older scheme of teaching became fundamentally impaired. With each change there resulted an increasing concentration of subject matter, until now the course is commonly represented in a condensed schedule of work which is uniformly difficult, and replete with intricate detail throughout. This condition confronts beginning students of today with what formerly were considered to be advanced phases of the work. As a result, they are delayed in their orientation in the subject and there is a considerable loss of time before they are able to work effectively.

One may criticise the older didactic method of teaching for its reliance on the spoken word as the principal means of instruction; but unless greater opportunity is given to study of the actual structures exposed in dissection, the fault can be continued in overindulgence in the printed word—excessive dependence of the students on book study. The common attitude toward laboratory work seems to imply that laboratory hours should be spent entirely in dissection. During a student's first dissection of the human body, his mind is occupied more with the procedure of exposing the structures than with the structures themselves. Consequently, if

all of his time in the laboratory is used in dissecting, he has little opportunity to develop concrete visual knowledge of the structures he brings to view. The result is that during his evening study at home, he must depend on his imaginative powers to construct, with the help of his books, visualizations of the anatomic structures, that, in contrast to direct visual impressions, are extremely uncertain and nebulous. Hence, while dissection is required to meet the needs of efficient study, it is not logical to attach undue importance to that act. Knowledge of anatomy is the end in view; dissection is only a necessary means toward that end.

Activities of the Staff. Increasing departure from didactic methods demonstrates general recognition of the fact that success in teaching anatomy depends primarily on the degree of mental receptiveness of the students rather than on the efforts of the instructors to implant knowledge in their students' minds. Anatomy, as a subject calling for an extensive accumulation of factual matter, must be learned rather than taught. This statement does not, however, mean that the responsibility for the success of the course should be shifted to the students; because it lies within the jurisdiction of the staff alone to control the conditions on which the success of any course directly depends. It should also be remembered that many first year students have not yet attained that degree of maturity which seeks or accepts responsibility voluntarily. The latter condition, of course, is one which primarily affects individual students; nevertheless, in the collective results, the pedagogic success of the course itself becomes adversely affected. It appears, therefore, to be the duty of the staff not only to furnish necessary guidance and instruction, to sustain the interest of the students, and to promote their most efficient efforts, but it may properly be extended to assume the responsibility of checking on their progress from time to time.

In the final analysis, the course in anatomy is not an entity in itself (unless viewed from the standpoint of the applicant for advanced work in natural sciences). As part of a medical school, the department is under definite obligation to the institution. It aims to instill, within its allotted time, the highest possible degree of anatomic knowledge in each student, as its contribution toward developing his ultimate professional ability as an alumnus; more immediately, it must make certain that each student acquires an able working knowledge of the subject as the foundation on which his teachers in the upper classes can build most effectively.

III.

Features of the Present Course. As a result of the foregoing observations, the design of the present course, although introducing nothing of a radical nature, presents features which in their combination com-

prise a distinct departure from the conventional plan of teaching anatomy. The principal features of this course are listed as follows:

1. The use of two complete dissections: the first, applying to all gross structures and viscera; the second, to the vascular and nervous systems with concurrent review of the gross structures.[1]

2. Early orientation of the students by grading the course from a comparatively elementary beginning, with subsequent inclusion of more complex phases as the students gain familiarity with the subject.

3. Arrangement of the students in pairs, working as partners (four students to the table), so that their time in the laboratory is divided between dissection and the study of the actual structures which have been exposed.

4. Dissection maintained in corresponding regions on each side of the cadaver, and a regional sequence followed through the course of the two dissections.

5. Coordination of the lectures with the sequence of the laboratory work, so that the discussions apply directly to structures exposed by dissection; thus dispensing with a systemic sequence of lectures as a more or less independent and isolated part of the course.

6. Emphasis on the use of laboratory material instead of books as the chief basis of study, in order to promote a vivid and lasting visual knowledge of the structures rather than a word-concept only temporarily memorized.

7. Use of a manual designed especially for this type of course, one which identifies for the students the most useful and important facts to be learned in each dissection, with concise directions for dissection and study.

8. Dependence on the mental receptivity of the students as the principal factor in efficient pedagogy, rather than the didactic efforts of the teachers.

9. Stimulation of the students' interest by inclusion of developmental, physiologic and clinical aspects to a degree consistent with the range of fundamental knowledge in morphology necessary for the subsequent work in upper classes.

10. Use of periodic tests as a check to enable students as well as teachers to measure individual accomplishment and progress.

IV.

Comment on the Features of the Course. Feature 1, involving the use of two dissections, is amplified by feature 2, which refers to a progressive grading of the course from simpler, gross studies to the detailed

1. This feature does not require a greater number of cadavers than are generally used, as will be explained later.

and more complex phases of the human organism. It is not difficult for beginning medical students quickly to gain an understanding of the characteristics of the major structures. If students are limited to this phase of the subject during the first dissection, they can cover the entire scope of the human mechanism rapidly, with their interest sustained at a high pitch, because of the novel features of each region unfolded, and at a rate of speed which will not overtax their ability to acquire concrete knowledge of those principal structures. With such information of the major parts of the human body to serve as a sound working basis, the second dissection is approached by the students with eagerness and confidence.

When only a single dissection is afforded the students, their opportunity to make a satisfactory study of the gross structures is definitely impaired; because, in order to follow the continuity of the vascular and nervous systems in a detailed dissection, the integrity of many of the larger structures must be sacrificed. The procedure, in itself, tends to over-emphasize the importance of details. In contrast, the plan for a double dissection insures a full valuation of the larger structures, with a helpful review of them, made possible in the second dissection, while their sacrifice, for the sake of disclosing the desired details and continuity of the vascular and nervous systems, does not impose a handicap on the students.

The amount of time given to the first and second dissections is 150 and 210 hours, respectively. No greater demand is made on the supply of material with two such dissections than when four students work independently on different parts of the body. By the older method, each student performs a detailed dissection on one portion of a first cadaver and on a different portion of a second; whereas, by the method described here, four students are carried entirely through the two cadavers, each two partners being responsible for the dissection of their respective half of each body.

The next four features—3, 4, 5 and 6—are closely interrelated. As a result of having the students working in pairs on corresponding regions on each side of the cadaver, a uniformity of interest prevails throughout the class. This arrangement facilitates the designing of the course to follow a regional sequence in the matter of lectures, as well as of laboratory work. The advantage gained by this is that the discussions apply directly to the tissues which the students are dissecting, and with which they have at least some familiarity; whereas, an independent systemic sequence of lectures will inevitably anticipate, by an impractical margin, laboratory exposure of many of the structures discussed in the lectures.

Furthermore, pairing of the students allows them to engage alternately in dissection and in study (with the help of their books) of the exposed structures, unhampered by the need of attending painstakingly to the pro-

cedure of dissection. It is hardly possible to overestimate the value to the students of such study based directly on the anatomic tissues. The visual knowledge of anatomic parts is the only practical and lasting knowledge. It can be acquired only by handling the structures repeatedly and studying them in their three dimensions. A memorized word-picture, developed chiefly from book-study at home, is, by contrast, inaccurate, extremely uncertain and less likely to be retained.

As to feature 7, the chief factor in the success of the present course has been the use of a manual developed specifically for the two dissections embodied in this plan. Although the six features considered thus far have contributed their part to the present course, our experience has shown that under the stress of limited curricular time the degree of success in such a plan of double dissection depends more than anything else on the selection and organization of subject matter as represented in this manual. It has been written to identify for the students the most important features in each field of dissection, and to give them suitable directions for dissection and study.

The manual forms the basic framework of the course and presents an orderly sequence by which progress can be made effectively and consistently through the extensive text which the subject of anatomy covers. It in no way restricts the activities of the staff in amplifying any phase of the subject for which amplification may seem desirable, nor does it inhibit the initiative of the individual student. On the contrary, by identifying the most important facts and aiding in their mastery, the knowledge gained forms the most favorable basis on which each student may add to his information in proportion to his individual ability.

Two dissections of the human body, as ordinarily performed, are not possible in a course covering 360 hours. But if they are undertaken according to the present plan, which regards what the student learns from the dissections as being more important pedagogically than how completely and skillfully the cadavers are disintegrated under his hands, then two dissections are quite possible within such a time limit. A first dissection of the gross structures and organs can be made in 150 hours, if the nerves and blood-vessels are left out of consideration (except for the mere identification of their major trunks); and the second dissection of the nervous and vascular systems can be completed in 210 hours, as it does not involve a concurrent primary study of the gross structures.

However, the plan in its entirety is based on, and requires, consistently efficient and purposeful effort on the part of the students. It precludes unwarranted expenditure of time, through aimless curiosity or ignorance of the subject, in dissection of structures that do not bear directly on the

subject-matter under assignment. The enthusiasm of beginning students is naturally displayed in a healthy and active curiosity; but in their untrained state, it tempts them too easily into departure from properly directed effort. If they yield to such temptation, or if they lack a concrete plan of procedure, the students run the risk of dissipating their energy at the sacrifice of real progress. Hence, the possession of a definite plan of work with close adherence to it, safeguards the effective progress of the students; also, as a factor in their mental training, it enables them to impose a discipline on their desire to learn, which will result in more profitable habits of study and more orderly thought.

Little comment is needed on the last three features, 8, 9 and 10. Their use is quite universal, and they are included here merely to complete the description of the course. Presumably, the natural degree of receptivity of each student is in proportion to his interest in the subject and his willingness to apply himself to it. Any means that is useful in stimulating the student's interest will naturally contribute to his greater efficiency. Hence, as a source of healthy stimulation, it proves very desirable to add reason and purpose to the morphologic studies by the inclusion of developmental, physiologic and clinical aspects.

Development of efficient methods of study among the students can reasonably be regarded as one of the most important phases of the first year's work in medical school. Toward this end, the use of periodic tests and quizzes possesses real importance. First, the use of such tests challenges the students to exert their best efforts and most earnest application to thir work in this earliest stage of their medical education; and second, it provides a means whereby the students can measure from time to time the success of their efforts as judged by their teachers; evidence of weakness will almost invariably be followed by the effort on the part of each student so affected to improve his method of study.

V.

The most difficult part of the teaching problem as it faces departments of anatomy today, seems to lie in furnishing to the students, within an abbreviated course, knowledge of the subject comparable in its practical value with the standard established in past years. The earlier results were gained largely by reason of the liberal amount of time given to the subject; for then, the plan of teaching was a very simple one as no need existed for particular attention to educational principles as we now know them. In the meanwhile, however, conditions have become greatly changed, and increasing reduction in curricular time allowed to anatomy emphasizes the desirability of every element of pedagogic worth that can be brought into the teaching of this subject.

Obviously, each department must consider the changes and their remedy according to local conditions, for the problem is by no means uniform in all medical schools throughout the country; in some schools, slight alterations undoubtedly have been sufficient to satisfy the situation; but in others, the necessary modifications have been so great as to have produced a crucial change in the anatomic pedagogy of those institutions. It was through such latter circumstances, caused by a sudden shortening of the course in anatomy from two years to one year, that our present plan was formulated. The plan has been definitely adopted since its effectiveness has been amply demonstrated in the preparation of the students for upper-class work, and by the results of outside examinations (national and state boards). Also, its popularity among the students is worthy of note. Every member of the teaching staff has made direct contributions to the course. I wish to express my most sincere appreciation of the confidence extended to me by Professor Samuel R. Detwiler, head of the department, and Professor Philip E. Smith, for without their sympathetic support it would have been impossible to undertake what appeared to be a rather radical departure from the more conventional methods of teaching this subject. The results, however, seem to have fully justified the effort involved, and it is hoped that this report may contain suggestions which will prove useful elsewhere.

As a final comment, we cannot note what has transpired during recent years without realizing that further changes are inevitable. The trend is definitely toward cutting the time given to fundamental branches in accordance with the extent of their direct contribution to clinical needs. As part of medical schools whose primary object is to furnish their prospective graduates with the best training possible for the practice of medicine and surgery, the fundamental departments cannot resist such changes; their obligation is to continue in their cooperation toward this ultimate purpose by presenting their respective subjects in their most able manner, irrespective of the difficulties which may be imposed on them. Departments of anatomy have consistently maintained the standard of pedagogic results on a par with those of the past, in spite of increasing curtailment of time for teaching the subject; and it seems reasonable to believe that our future difficulties will be overcome just as successfully. To do this, however, we shall have to place reliance chiefly on progressive improvement in the quality of our methods in pedagogy.

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Medical Genetics

An Essential Part of the Medical Curriculum from the Standpoint of Prevention*

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By medical genetics I mean a course in the application of the science of genetics to pathological heredity in man. Medical students are supposed to have had a sufficiently thorough training in the fundamentals of genetics in their premedical courses in biology to enable them to understand without further preliminaries a discussion of these principles as exemplified in disease. Medical genetics should be taught in the medical school, in the final year of medicine, by a medically trained person, conversant with the broader aspects of the science of genetics. It should not be given by a geneticist who is not medically trained, inasmuch as such a person is unacquainted with the phenomena of disease, and their diagnostic significance. It should not be given before the final year in medicine because the student is not yet familiar with the signs and symptoms of disease, and hence cannot appreciate even the terms used in the discussion.

Such a course in pathological heredity, or medical genetics would be of value from four distinct points of view: diagnosis, therapeutics, prevention and public health. We will consider each of these briefly, laying the stress chiefly on the preventive aspect and on its value as a public health measure.

First, we will give a few examples of the value of a knowledge of inheritance in disease from the angle of better diagnosis. Because many of the hereditary diseases are relatively rare, the student does not study them unless he does so as examples of hereditary disease. Not having a course in heredity in disease he does not study them at all. Hence, when he meets them in practice, he often fails not only to recognize the hereditary nature of the syndrome, but even the disease itself.

For example, a child had a bony lump on its arm. A diagnosis of sarcoma was made. Operation was advised, but the parents refused. Later the child was sent to another city, where a diagnosis of multiple exostoses was made. It was then found that the father also had these bony lumps all over his body. An acquaintance with this hereditary disease, and with the fact that it was inherited, offered the correct diagnosis and saved this child's arm. It might be said that the keen diagnostician would have rec-

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ognized this disease even though he was unacquainted with its hereditary nature. This is true; the fact remains that the average practitioner had not heard of multiple exostoses and hence did not diagnose it. Had he had a course in medical genetics, he would at least have heard the name and the symptoms of the disease.

Another example of the aid in diagnosis furnished by the knowledge that disease is inherited is the case of a child whose skin was very dry, who had sparse hair and but one tooth. A diagnosis of hypothyroidism was made and the child placed on thyroid medication. This not only failed to benefit the patient, but made him more uncomfortable. After a great deal of this treatment, the child was taken to another physician who saw that the mother also had very few teeth and who obtained a history of dental aplasia in other members of the family. He identified the condition as congenital ectodermal dysplasia, with more extensive involvement in the child than in the mother. He stopped the administration of thyroid since this had been as deleterious a type of therapy as could have been devised. Due to lack of sweat glands, the child was already suffering from inability to regulate his body temperature. Thyroid whipped up his metabolism so that his temperature was higher than it would have been otherwise. The recognition of the dental aplasia in the mother gave a clue to the correct diagnosis of the child's disease.

Let us consider pernicious anemia. The occurrence of pernicious anemia in one member of a family may enable one to make a diagnosis of pernicious anemia in a second member, long before it would have been possible otherwise. Examination of the gastric contents in other members of the family may reveal an achylia and achlorhydria when no other signs or symptoms are present.

Better diagnosis inevitably means more rational therapy. Hence, a study of inheritance in disease means better therapeutic measures due to better diagnosis. Thus in the case of multiple exostoses, the child's arm was saved, because it was recognized that he did not have a sarcoma. In the case of the ectodermal dysplasia, it became evident that thyroid medication was incorrect, and although the child could not have sweat glands supplied, he could at least be spared an accentuation of his condition. In the instance of pernicious anemia, the potential case with achylia and achlorhydria can be given the appropriate therapy and so be spared the onset of the disease. If not completely inhibited, the disease may, at least, be delayed in development many years. This preventive therapy has actually been carried out on identical twins whose father was a pernicious anemia patient. By examining them, although they had no blood picture of the disease, and no symptoms suggestive of pernicious anemia, the phy-

sician was able to diagnose in them the pre-anemic stage. It might be objected that they would never have had the anemia. It has been shown, however, in the case of patients in whom achylia and achlorhydria have been found accidentally, that pernicious anemia did develop after a lapse of several years.

Perhaps as spectacular an instance of therapy based on a knowledge of genetics as could be furnished is that devised by Birch for hemophilia. On the face of it, one would think that there could be no more absurd therapy than ovarian hormone for bleeding in a hemophiliac male. Who would ever have tried so senseless a procedure as that, expecting it to work? Yet Birch argued that lack of a sex chromosome was all that differentiated a male from a female, and that the presence of this sex chromosome was what prevented the condition of hemophilia from being evident in the female, while its lack permitted the male to bleed to death. What else did the sex chromosome do? It made the female manufacture female gonads with their hormone, instead of male gonads with theirs. Hence, female hormone injected into the male might confer on him the immunity that the additional sex chromosome gave to the female. She tried it and it worked. Others have also tried this apparently most irrational therapy and found that it does control most effectively the bleeding in hemophilia, as transfusions and other means formerly used do not.

If female hormone seems irrational in hemophilia, who would expect it to alleviate blindness in retinitis pigmentosa? Yet Wibaut has reported improvement and almost a spectacular cure of this disease with menformon. Snapper has had brilliant results in thromboangiitis obliterans with the same thing. All of these seemingly irrational therapies, far from being senseless as one would be apt to say they were, seem to have a very rational basis in genetics, if looked at from that angle. Moreover, they seem to work. They are worth trying out further. They would never have been thought of without the fundamentals of sex-inheritance being known, and applied to the problem. Medical genetics in these instances was the golden key which unlocked the door of the temple that guarded the secrets of Aesculapius.

If diagnosis can be made more accurately, and proper therapy instituted earlier, we ultimately arrive at a stage when therapy can be instituted sufficiently soon to act as a preventive measure. Thus, while one cannot restore the deficient gastric secretions in pernicious anemia, one may be able to prevent the clinical manifestations of the disease. As this cannot be tried out on the whole population, a knowledge that it is inherited gives the physician a clue as to the specific individuals to be examined as potential cases. The pre-diabetic case may be found to have

a prolonged rise in blood sugar for some time before the appearance of sugar in the urine, and for a very considerable time before the onset of symptoms. Proper dietary measures begun early, administration of insulin at the very onset of pancreatic damage, may be the means of preventing diabetes from becoming an outspoken disease in that patient.

The occurrence of uterine carcinoma in one woman may be the means of detecting a precancerous lesion in her sister before it becomes cancer, thus offering opportunity for removal of the uterus. Examination of the rectum of those members of a family in which one member has succumbed to carcinoma of the rectum may reveal the polyps which so frequently are the forerunners of carcinoma. If single, they may be excised; if multiple, that portion of the rectum may be excised before cancer actually sets in. This has been done by Dukes in England and offers brilliant demonstration of the preventive rôle that heredity in disease affords in the practice of the art of medicine.

One cannot examine the whole population for evidence of thyroid dysfunction, but the presence of goiter, or lowered basal metabolism in one member of a family may help to clear up a group of borderline symptoms in other members of the family and therapy may be commenced before the disease actually becomes pronounced.

A great amount of research needs to be done on all of these constitutional disorders, and much may be learned by realizing that we have a population more apt to develop them, if we consider the families of those already having shown them, than if we look for them in the population at large. In the cardiovascular-renal diseases, how long do the kidneys function below par before it becomes evident enough to make the patient come for treatment? How long is the blood pressure elevated before the patient has symptoms? We do not know the answers to a great many of these questions concerning the early stages of disease for, when we get the patient, it is because he has developed symptoms that bring him to us. An intensive study of the apparently unaffected members of the family may throw a great deal of light on the initial stages, and ultimately on the initial causes of these diseases. With a knowledge of etiology, we are one step nearer to prevention.

But it is not only in the realm of the constitutional disorders that prevention may be brought into play. We are beginning to learn that even in the infectious diseases there is a great difference between various families in their resistance. In tuberculosis, there is very good evidence that the soil for the disease is hereditarily susceptible in some families, much less so in others. If this is the case, not only are we justified in taking away a case of active tuberculosis from a family, but also in trying

to build up the resistance of the unaffected members so that they need not succumb even if they do encounter a few million tubercle bacilli. Removal of infection is not enough; increasing the resistance of those left behind is just as important. We have done this in the past, perhaps from the standpoint of prevention, not fully aware that we were going on the basis that the increased resistance was necessary because of the hereditarily greater susceptibility. Nor is tuberculosis the only infectious disease which has an inherited background of susceptibility. It is becoming more and more evident from the researches of those engaged in animal experimentation, as well as from the observations of those concerned with the treatment of disease in man, that in infectious diseases heredity plays a very conspicuous rôle. Not all persons exposed to scarlet fever or diphtheria or whooping cough contract the disease. Some families are particularly susceptible to pulmonary infections, some to localization of the infection in the joints, heart, or nervous system, so that some persons who have bad tonsils never get endocarditis, or chorea; while in other families, several members will be affected. Some persons are especially liable to middle ear infections with the slightest sore throat, others never get it. This must be due to some anatomical peculiarity that permits the spread of infection along the eustachian tube in some persons, while inhibiting it in others.

We are beginning to see new applications of the parable of the sower scattering seed. Some of the seed of disease fell on barren rocks of racial resistance, and failed to grow. Some fell on the ground but the fowl of the air, or more appropriately the fish of the sea, namely the antibodies of the blood stream, came and devoured it. But some fell on fertile ground and took root, and spread rapidly, grew to maturity and manufactured more seed for future fertile fields.

The immunity to tuberculosis which we have been accustomed to speak of as being due to early mild infections which gave the child opportunity to build up his defenses, may be, I should say is, due to an inherited nonsusceptibility, so that the seed fell on barren ground. Observations of your own will serve to confirm this idea. I recall two families living in adjoining houses, whose children played as much in the neighbor's house as in their own. The T family had no tuberculosis in it for three generations, at least on the mother's side, and none for four generations on the father's side. The B family had tuberculosis in it, the grandfather dying of it, the mother having it for a period of ten years at least before she died, and the baby dying of tuberculous meningitis. The T children played in that house where the mother was sick, and even minded the sick baby but never got the disease; while three of the B family died of it.

When the diphtheria epidemic came along the B children contracted it, and one died, but the T children never were affected.

Some races are more immune to certain infections than are others. The negro race is more susceptible to pulmonary infections than is the white race. This is not due entirely to poor housing conditions among the negroes or to inadequate nutrition. If exposure to infection was the only factor concerned, we should expect to see the numerous exanthemata of childhood rife among them also; but the dark skinned race seems to be more immune to skin diseases than is the white race. It has been said that skin cancer is less frequent among the dark skinned whites than it is among those of the lighter complexions.

But it is not among the infectious diseases that utilization of a knowledge of heredity is to play its most striking public health rôle. With our compulsory vaccination against smallpox, we need not worry whether the population is susceptible or not. With our modern sanitation, we do not have to breed a race that is immune to typhoid, for we can eliminate it by speedier methods. Our brilliant successes in combatting the infectious diseases by immunological therapy diminishes the importance of the hereditary susceptibility of the individual to these maladies. We may even be able to accomplish similar results for tuberculosis, so that even the susceptible may be made immune, and thus do away with this dreaded scourge.

But with every step forward in prevention of infectious diseases, we automatically create a larger class to die of the constitutional disorders, most of which are based on inherited defects in some organ or group of organs in the individual. Death is inevitable, and if we lighten the death rate from infectious diseases, we weight the scales just that much more heavily in favor of the death rate from inherited causes. This does not mean that we should cease in our endeavors to lessen the infectious death rate, but it should make us pause as to what type of persons we are saving to continue existence.

Many of the constitutional disorders are such that they do not come on until middle life or old age; they permit a life of usefulness before they descend upon their victim; they may be postponed even then for longer or shorter periods of time as new preventive methods come into vogue. With such we do not deal from the public health point of view. They remain purely in the field of individual therapy. Such persons are able to be useful citizens, to look after themselves and to pay their own way.

But with these useful persons our preventive medicine is also saving much that is not only not useful, but that is a veritable millstone about

the neck of society. Many of these socially inadequate persons are what they are because of heredity. It makes no difference whether the disease with which they are afflicted came to them by way of germs or germ plasm, the disease is transmissible, and so comes under the category of public health.

One does not regret the expense of a public health program that saves useful lives to be worth while members of the community; that more than pays for itself, no matter what the expense. But should we continue a public health program which gives nothing in return except further material for a public health program of tomorrow? What would we say of a public health officer who threw cultures of virulent typhoid bacilli into the city water supply so that he might have more typhoid cases to clean up? Or of the medical health officer who swabbed the children's throats with diphtheria bacilli so that we might inject more antitoxin? But that is the very attitude we take toward one of the most pressing public health problems of the day, important both numerically and financially. That is the problem of mental health.

The president of the American Psychiatric Association said in his presidential address in 1931 that there were about 1,800,000 persons in the United States whose mentality was so low that they needed institutional care or aid from the community. He said that in Canada there were more than 27,000. In the Province of Ontario alone, we have about 11,000 persons who are in our institutions at the cost of $11,000 a day; or $330,000 a month or more than 4 million a year. Last year there were 2,500 new admissions to our hospitals; but there are by no means 2,500 deaths, so that the number is increasing in the asylums faster than the population outside is increasing. There is a waiting list for the school for feebleminded as long as the list already in the school. Nor is this all. There are six mental health clinics in Ontario with a psychiatrist, social worker, psychologist, and sometimes more than this on the staff. In Ontario alone about 4,800 patients were treated at the mental health clinics last year. Many of these would have been admitted to the hospitals, but with the system of mental health clinics were looked after at home.

When one considers that in Ontario only about 25,000 persons were added to the group over 19 years of age in 1929, and 2,500 persons were placed in the insane hospitals, we see that an alarming proportion of our population is coming under the category of the mentally ill.

Dr. McGhie, of Ontario, estimates that at least 60 per cent of this mental ill health is hereditary. Dr. English, the president of the psychiatrists association, estimates that about 80 per cent is hereditary. This problem of mental ill health is the most pressing public health problem of

the day. It is costing the public far more, and giving far less in return, than any other public health enterprise. In order to lessen the expense to the public, the patients are released to their homes as soon as possible, where they can be looked after. This release often means for the woman another pregnancy, and, perhaps, for the man one or more children procreated. They come back to the hospital when they get worse, but they have started a whole new train of disease in persons who in twenty years will be back again in the hospital as new admissions.

Would we as a medical profession tolerate a typhoid carrier acting as cook in a restaurant or in a private family? Not until she was absolutely free of any opportunity of passing on the disease. We compel her to remain in isolation until she can no longer transmit. We have compulsory vaccination for smallpox, not only to protect the person vaccinated but to prevent him from being a public menace. We do not wait to see if he will develop smallpox, we assume that he may do so. We must begin to look at the problem of mental health in the same way and take the necessary precautions against its further propagation. The present policy of keeping mentally unbalanced patients in a hospital is an expensive one; to permit them to be kept elsewhere than in a hospital is a suicidal one. It merely means a multiplication of an already acute problem.

It may be objected that I am painting the picture with too lurid a coloring. I merely quote from the gynecologic consultant of one of our largest Ontario hospitals for the insane. He said that he had taken to sterilizing his female patients before discharging them, if permission could be obtained from the necessary authorities, because he had found that such patients, discharged because they were capable of being looked after at home, came back in a very short time, with another attack of mental illness, and most frequently pregnant. Sterilization of these patients only solves a small part of the problem; it does not touch the male patient released during improvement, nor those female patients whose guardians refuse consent for sterilization.

There are those who maintain that these mental cases are due entirely to environmental factors operating during childhood, and that sterilization will not solve the problem. To this we can answer that if this contention be true, then bringing up normal children in an environment in which one or both of the parents is mentally abnormal is the surest way to produce future abnormalities in the normal child. Hence, even if these conditions are not hereditary, we have no right to inflict on the normal child insane parents who produce an abnormal environment.

There are those who say that although these defects are inherited, they appear so frequently in the children of normal parents that sterilizing

all those mentally ill today would not decrease the percentage of mental illness tomorrow. This contention is ill-founded. In the first place, although you do occasionally find normal people producing mentally deficient offspring, you do not often find the mentally deficient producing normal offspring. You practically never find two feebleminded persons having normal children. You will not eliminate all cases of mental illness, even though inherited, by sterilization, but you will eliminate a great deal of it. Goddard has considered that feeblemindedness was due to a pair of single recessive factors. This may be too simple an explanation, but we can use it for mathematical analysis.

If feeblemindedness be due to the presence of two recessive factors aa, and normality be listed as AA, and the hybrid form as Aa, then if we started with a single union between a normal person and a feebleminded one, we would get all children normal but capable of producing feebleminded individuals. Matings between such normal hybrids would give three types of persons. The proportions would be one wholly normal to two hybrids to one feebleminded. Now, if such persons mated without selection, and had the same size families, then the population would always remain at about that level, one wholly normal, one abnormal, and two normal but capable of producing abnormals. But let us suppose that each time an abnormal person is born they are removed from the population or what is the essential thing, from the possibility of reproducing. They are still in the population, but they cannot pass on their defect, in other words they are sterilized. The proportions at once change from 1:2:1, and become 4:4:1. That is, there are nine times as many normals and hybrids as there are abnormals. Under the first condition there were only three times as many normals and hybrids as abnormals. Thus, we have increased by 300 per cent the proportion of normal to abnormal, by the expedient of removing the possibility of reproduction from the abnormal.

Moreover, we have reduced the percentage of those actually capable of passing on the defect. In the first instance of unrestricted propagation, the percentage of the population who were hybrids capable of passing on the defect was 50; in the second instance the percentage has dropped to 44. We still are getting feebleminded persons, it is true; sterilization has not eliminated the problem. But we have made them only 11 per cent of the population instead of 25 per cent. If the province of Ontario, or the government of the United States, would be able to cut their bill for mental deficiency by more than 50 per cent, would it not be worth while?

But let us look at the other aspect of the picture. Far from there being selection eliminating the feebleminded, the selectivity in mating is

of such a type that it forces the feebleminded to mate with themselves and not with normal stock. This is a good thing, you say, since it prevents contamination of the good stock. Yes, but look at the results. If normals and hybrids mate with normals and with hybrids, thus forcing the abnormal to find their mates among those of the same level, then we alter the percentages of these three classes in the community. Starting again with the third generation resulting from the cross between a normal and a feebleminded person we get exactly equal numbers of normals, hybrids and abnormals. Our policy of forcing the abnormal to mate with his kind has raised the percentage of abnormals to one-third the population, and has also raised the number of hybrids to one-third, so that whereas before we had either 75 per cent or 89 per cent of normals or hybrids in the population we now have only 67 per cent.

Of course, these figures would be changed if feeblemindedness were to be dependent on two sets of recessive factors in place of one set, but the principle remains the same, namely, that since normals do not want to mate with abnormals, thus forcing the latter to find their mates among their kind, we are increasing the percentage of abnormals in the population. Moreover, this whole problem has been worked out on the supposition that all the families were of the same size, and that all types of persons married with the same frequency. It is a matter of fact that the more intelligent men and women do not marry with the same frequency that the less intelligent do, and it is notably true that the mentally inhibited have much larger families than do the intelligent. Therefore, the abnormals increase at a rate out of proportion to the increase of the population.

Mental deficiencies and abnormalities are inherited in the vast majority of cases. Their care imposes a financial burden on society that is fast becoming unbearable. They form a very vital public health problem, not only because their care is paid for from the public purse, but because they are transmissible diseases, transmissible from parent to child.

Medical men dare no longer ignore this problem, for the world looks to them for aid in the face of great scourges. Their appeal has not been in vain, and medicine has come to their rescue. When it has come, however, it has curtailed their rights in the interest not only of themselves but of the public. People can no longer spit where they choose; they can no longer dump their sewage into a stream if it endangers their neighbor's health; they have to be vaccinated whether they will or no, and they have to go into quarantine for all sorts of infectious diseases, however inconvenient such quarantine might prove to be for them or their families. Such quarantine was purely in the interests of the public; it held naught

of relief for the diphtheria or scarlet fever or smallpox patient. Will the medical profession fail to accept this new challenge which holds just as much hope of relief for the public as did compulsory vaccination? As former Chief Justice Holmes of the United States Supreme Court said, "The principle that sustains compulsory vaccination is broad enough to cover the fallopian tube" and Dr. English adds "also the vas deferens."

The profession has accepted the challenge of protecting the public against increasing physical ills; it dare no longer refuse to face the issue of protecting the public against the increasing tide of mental disease. That they have done so in the past has been in large measure due to their lack of understanding of the principles of heredity involved in transmission of mental disease, and to the over-emphasis of the part played by the environment in its production. Not until we educate physicians in the principles of genetics in their premedical days, not until we have a course in medical genetics in the final year, taught by a person trained in medicine and conversant with the broad aspects of genetics, will we fulfill our duty to them and to the public who turns to them in their hour of need. To leave it to be taught by clinicians who may know little of or who may not be interested in the subject would be like leaving obstetrics to be taught as an aside by the radiologist. As physicians become more conversant with the subject of heredity in disease, they can make more correlations between their work and that of the medical geneticist, but that would not do away with the necessity of a course in medical genetics.

It is feared that such a course would involve the physician too much in the "eugenic propaganda." Sir William Osler, in his fight to have sanitary sewage disposal in Baltimore as a preliminary to his fight to lower the typhoid death rate, had to face the political entanglement into which such a scheme plunged him. Insofar as the eugenic program touches the field of prevention of disease, the physician must accept the connection. The aim of the medical profession is to give the public the best it can, the best which the accumulated knowledge of the day entitles them to expect. Unless the physician is thoroughly acquainted with the field of heredity in disease as it applies to man, he robs himself of some of his best opportunities for making a diagnosis, his patient of the best in therapy, the potential case of disease of the best in preventive medicine, and the public of the best that can be offered to them to relieve them and the future generations of the crushing weight of hereditary disease.

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DISCUSSION

Dr. B. D. Myers (Indiana University School of Medicine): We are indebted to Dr. Macklin for bringing to our attention again the increasing importance of a formal course in heredity and eugenics for premedical students, with a course in human heredity for senior medical students. At Indiana we have had for many years a course in heredity and eugenics recommended for premedical students and for two years we have been giving a course for seniors on constitutional inadequacy in which the hereditary background and environmental influence on constitutional morbidity is emphasized.

Perhaps the most important publication in this field is the book by Baur, Fischer and Lenz, entitled "Human Heredity." Lenz has written the section on "Morbific Hereditary Factors." As one reads this section, one is impressed anew with the importance which heredity is rapidly assuming in the field of medicine.

The ophthalmologist talks of heredity in connection with albinism, errors of refraction, myopia, hyperopia, squint, ptosis, retinal atrophy, night blindness, red-green blindness. The otologist discusses inherited deaf-mutism. The dermatologist discusses hereditary hypotrichosis, absence of fingernails, clubbing of finger ends, partial albinism, etc. Physicians in general comment on hereditary anomalies of body form. Lenz says "Every error of development is primarily dependent upon an error of development in hereditary equipment." Strictly speaking, therefore, we are not entitled to say that an hereditary error of development originates at any particular moment of time. We can only tell when its existence first became manifest. In common parlance the word "malformation" is used for those deviations of form which are already obvious at the time of birth. But we cannot say that birth is the latest moment at which a malformation or error of development may arise. The individual's development is by no means complete at the time of birth. We can, therefore, speak of hereditary exostoses although they do not exist at birth but develop later in life.

Polydactylism and syndactylism are definitely hereditary. Lenz states that it was in a case of brachydactylism that the Mendelian law of inheritance was first proven to apply to human beings. Hammer toe, split foot, club foot, are hereditary. Congenital discocation of the hip joint is, at least in part, due to hereditary transmission.

"It seems that one and the same hereditary factor, during embryonic development, may give rise to an arrest of development in varying degrees in different individuals known as harelip and cleft palate."

"Malformations shade into constitutional anomalies, disorders of metabolism, disturbances in the functioning of the endocrine glands and susceptibilities to particular diseases. The asthenic constitution is the classical instance of a constitutional anomaly. Heredity is without doubt the main cause of asthenia."

Dwarfism is an hereditary malady. Most cases of infantilism are unquestionably due, in the main, to hereditary influences. Scoliosis and kyphosis tend to run in families.

Hemophilia is hereditary. Constitutional hypertension or hypertonia is an hereditary diathesis of great practical importance."

Obesity and gout are hereditary.

"Hereditary predisposition is an important contributory cause of inflammation of the kidneys that results from infection. Hereditary predisposition is also of great

importance in connection with the etiology of those forms of heart failure which are sequels of valvular inflammation of the heart."

Lenz observes that "persons alike in idiotypical constitutions will, owing to differences in environmental influences that have acted upon them, display different degrees of susceptibility to infectious diseases. The actual predisposition of an individual is always jointly determined by his hereditary equipment and by the environmental influences which have acted upon him."

The normal organism has at its disposal a number of protective institutions to safeguard it against the exciting causes of disease. Among these protective agencies are antitoxins which are formed in the absence of specific stimuli as the outcome of hereditary predisposition. When, however, the body is invaded by the exciting causes of disease, there ensues a marked increase in the protective substances. The capacity to form antitoxins is idiotypically, that is, hereditarily, determined.

Hereditary, likewise, is the capacity to form a specific antitoxin as the need for this or that antitoxin may arise, and the sum total of these capacities varies from person to person. Thus, according to Lenz, the formation of immunizing substances must be regarded as nothing more than a development and intensification of capacities preexisting in the organism as parts of the hereditary equipment.

There is, in the rigid sense, no such entity as inheritance of an infectious disease. None the less, inheritance is of very vital significance, and within certain limits it absolutely controls the appearance of these diseases.

While it is indisputable that there cannot be true tuberculosis in the absence of infection with the tubercle bacillus, there is good reason to suppose that for practical purposes, hereditary susceptibility is more important than infection.

When one studies diseases of the nervous system, one finds hereditary muscular atrophy usually reckoned among the diseases of this system. Also hereditary are spastic spinal paralysis, the progressive form of spastic paraplegia, many cases of multiple sclerosis, Friedreich's disease (hereditary spinal ataxia), Parkinson's disease, or paralysis agitans, Huntington's disease (a hereditary form of chorea) and Thompson's disease, or hereditary myotonia.

Speech disturbances tend to run in families. Many insanities and psychoses are hereditary. Goddard concludes that at least two-thirds of all cases of feeblemindedness are hereditary.

Lenz states that no other cause than hereditary predisposition has yet been discovered in the case of schizophrenia. Paranoid mental disorders, senile mental enfeeblement, amaurotic idiocy, epilepsy, the hysterical temperament, neurasthenia and many other nervous disturbances have an hereditary background.

This is a very incomplete list of the diseases which are hereditary. But merely to call them hereditary is not meeting the situation. The doctor should know the laws according to which their inheritance is determined.

For many centuries there was much talk about anatomy without much understanding of the structure of the human body. Gradually in the development of medicine, anatomy came to be recognized as a science fundamental to the study of medicine.

Now, after many years of loose talk about heredity, we are coming to realize that heredity is the foundation for anatomic structure and bodily form and constitution.

Attention to the patient's constitution is being revived, but with a difference. Pende, in his book on "Constitutional Inadequacies," defines constitution as the morphological, physiological and psychological resultant (variable in each individual) of the properties of all the cellular and humoral elements of the body, and of the combination of these in a special cellular state having a balance and functional output of its own, a given capacity for adaptation and a mode of reaction to its environmental stimuli. Such a resultant is determined primarily by the laws of heredity and secondarily by the disturbing influences exercised by the environment on the individual's hereditary plan of organization. To avoid the fall of the individual into that state of disease into which his interval destiny, his constitution, is dragging him, is the lofty task that we propose to undertake through the study of constitutional anomalies and inadequacies.

I believe the time is at hand when the educated doctor of medicine must have an understanding of the laws of heredity about as fundamental as his understanding of anatomy.

Medicine is essentially a biological science, and every fundamental element of life is important as a part of the equipment of the doctor of medicine.

The Teaching of Neurology in the Preclinical Years*

A. R. VONDERAHE
Assistant Professor of Anatomy, University of Cincinnati College of Medicine
Cincinnati

Herewith is set forth the experience at the University of Cincinnati with a newly organized course coordinating the anatomy, pathology and pathologic physiology of the nervous system. Prior to the development of this course, the arrangement for covering these subjects was as follows: anatomy of the nervous system, freshman year, second semester, department of anatomy; pathology of the nervous system, incidental lectures in connection with the course in general pathology, first semester, sophomore year; physiology of the nervous system, as at present, department of physiology, first semester, sophomore year. No provision was made for pathologic physiology of the nervous system.

A survey of courses in neuro-anatomy as described in the catalogs of the seventy-six class A medical colleges of the United States was made. Sixty-four of these colleges give a required course in the anatomy of the nervous system in the freshman year, eleven in the sophomore year and one in the junior year. The present trend, therefore, is to cover the subject in the freshman year. It need hardly be pointed out that the freshman student is not prepared for the pathologic implications of the subject. The descriptions of the courses suggest, in general, an emphasis on anatomy. Forty-seven schools did not list any course in neuropathology; eight offered electives in the subject, and twenty-one offered required courses. Of the twenty-one required courses in neuropathology, eight are given in departments of pathology, nine in departments of clinical neurology, and in four schools, there are separate departments of neuropathology. Generally speaking, neuropathology is an appendage of either general pathology or clinical neurology. Rather meager provision is made for the pathologic physiology of the nervous system; ten schools offer such courses, three, integrated with neuropathology, two in the department of neuropsychiatry and five in the department of physiology.

In 1923, R. S. Austin, professor of pathology, worked out a program which coordinated the courses of pathology and bacteriology[1]. Thus, when lobar pneumonia is studied in the pathology laboratory, the pneumococcus is studied in the following laboratory period in bacteriology. Thus, the student acquires a remarkable and extremely practical association of the

*From the Department of Anatomy of the University of Cincinnati College of Medicine.

1. Austin, R. S., Teaching of Elementary Pathology, *J. Assn. Amer. M. Col.*, 4:296 (Oct.) 1929.

various pathogenic organisms and the types of anatomic change they produce. The success of this method, as registered in the improved grasp of the students of both pathology and bacteriology, suggested the possibility of a similar coordination of the anatomy, pathology and pathologic physiology of the nervous system.

At this time, I had experimented with the scheme in an elective course in the applied anatomy of the nervous system. In this course, selected case reports, giving the symptoms and signs of some localized lesion of the nervous system, were given to the class as problems to be solved. A week was permitted the student to discover the exact area of the nervous system involved to produce the group of symptoms and signs. In this way the anatomy was intimately related with disturbance of function and the student's knowledge of the anatomy put in the most usable form for clinical and practical use.

In 1930, a general revision of the curriculum permitted the introduction of the new course by Dr. E. F. Malone, director of the department of anatomy, exactly as planned. In order to get the proper perspective, the present method of teaching associated subjects may be noted briefly. In the freshman course in gross anatomy, the student studies the gross structure of the peripheral nerves, the sympathetic nervous system, the brain and the spinal cord. In the freshman course in histology, the student studies the cellular components of the nervous system and has a brief introduction to the principal fiber tracts, using Herrick's Introduction to Neurology as a textbook.

In the first semester of the sophomore year, the student has general pathology. In this course the general pathologic effects on the nervous system are studied, but without reference to specific effects due to location of the lesion in particular parts of the nervous system. In this semester, also, the student has the course in physiology of the nervous system wherein the relation of muscle and nerve, reflex action, common and special sensibility are studied.

It can readily be seen that the student is now unusually well prepared for a course involving the correlation of anatomy, pathology and pathologic physiology of the nervous system and that the treatment can be quite exhaustive, as necessity of simplification of the subject matter no longer exists. This has been found to be the case. The relations of complicated structural formations of the nervous system are apparently much more easily remembered when the clinical symptoms and signs resulting from a destructive process involving them is known.

The course is intended to be intensely practical, and, accordingly, to fit the student in the clinic or on the hospital wards to describe with accu-

racy the localization of a lesion in the nervous system after the symptoms and signs are known. The course, therefore, has for its goal the training of the student not only in the general mechanism of the nervous system but in the procedure of arriving at a localizing diagnosis. It terminates with the ability to describe the anatomic site of the pathologic change. The types of this process, the course, prognosis and treatment are the subject of clinical neurology, medicine and surgery and the proper study of the junior and senior years.

The first six periods are devoted to the spinal cord. The gross relations are reviewed. The meninges are studied. The histologic structure of the cord at all levels is learned in detail. The tracts and their functions are learned. The technique of a clinical neurologic examination is discussed and illustrated. Selected case reports, presented as problems for solution, are given. These case reports give the symptoms and signs produced by clearly localized diseases of the nervous system and illustrate how structures involved by disease are associated with clinical manifestations. Thus, the pathologic physiology of the posterior columns is illustrated by cases of tabes dorsalis, the pathologic physiology of the anterior horn cells by cases of anterior poliomyelitis and that of the pyramidal tract by cases of hemiplegia following apoplexy. All types of changes are studied by the student in slides illustrating various disease processes. Slides of spinal cord tumor, multiple sclerosis and other diseases producing scattered changes are used for quizzes to test the student's capacity for coordinating affected structure and resulting disturbance of function.

In successive order, all structures of the higher levels of the central nervous system are studied: the medulla, pons, cerebellum, midbrain and the cranial nerves. Case reports of lesions at these successive levels, with their symptomatology, are given to the student, and microscopic slides presenting such lesions are analyzed with reference to disturbances of function. In a similar manner, the diencephalon and prosencephalon are studied by gross dissection[2] and by microscopic slides of the normal and pathologic areas. As each subdivision of the subject is concluded, a case report illustrating the clinical signs and symptoms resulting from characteristic lesions is given, and the relation of structure and disturbed function noted. The various cortical functions are illustrated by lantern slides of brains presenting lesions in these areas of the brain.

The method may be summarized as follows: (1) gross dissection of

2. The brain specimens used in this course are removed at autopsy at the Cincinnati General Hospital. A single horizontal section is made at the time of autopsy, and the brain is immediately preserved in formalin. The anatomic structure presented by this material is unusually well defined. Moreover, the student is furnished with an abstract of the clinical case report and general autopsy findings and thus is prepared to study the clinical symptoms and signs with reference to possible correlation with the pathologic findings. Very frequently students have found interesting and significant pathologic changes in this routine study. One brain is given to every two students.

principal divisions of the central nervous system; (2) microscopic study of structure; (3) case reports illustrative of lesions at various anatomic levels; (4) microscopic slides illustrating lesions studied in case reports; (5) correlation of structure and function.

CONCLUSION

A course coordinating the subjects of anatomy, physiology, pathology and pathologic physiology of the nervous system for presentation to sophomore medical students is described. After three years' experience it can be said that it has successfully accomplished its purposes:

1. Instruction in anatomy, pathology and physiologic pathology of the nervous system.

2. Coordination of the subject with reference to clinical cases.

3. Adequate preparation of the student for clinical neurology, neurosurgery and the neurologic aspect of all special branches of medicine and surgery.

Association of American Medical Colleges
Program for 1933 Meeting

To be held in Rochester, Minn., October 30, and in Minneapolis, October 31 and November 1.

MONDAY, OCTOBER 30

Symposium on the Report of the Commission on Medical Education

Relation of the Number of Medical Graduates to the Public Need.

W. C. RAPPLEYE, Dean Columbia University College of Physicians and Surgeons.

WILLIAM D. CUTTER, Secretary Council on Medical Education and Hospitals, American Medical Association.

C. R. BARDEEN, Dean University of Wisconsin Medical School (Representing the State University).

C. C. BASS, Dean Tulane University of Louisiana School of Medicine (Representing the Endowed University).

General Discussion

6:30 p. m. Dinner (informal).

L. D. Coffman, President University of Minnesota, will deliver an address at the dinner.

TUESDAY, OCTOBER 31

Symposium: Medical Care of the American People; Income and Distribution of Physicians

A. M. SCHWITALLA, Dean St. Louis University School of Medicine (Member of Committee on Cost of Medical Care).

R. C. BUERCKI, Superintendent Wisconsin General Hospital.

RAY LYMAN WILBUR, President Stanford University (Chairman Committee on the Cost of Medical Care).

Report of Committee on Aptitude Test

F. A. MOSS, Secretary of the Committee.

Discussion to be opened by J. M. H. ROWLAND, Dean University of Maryland School of Medicine.

Administration of Internships

JENNINGS C. LITZENBERG, University of Minnesota Medical School.

Administration of Clinical Clerkships

RUFUS Q. GOODWIN, University of Oklahoma School of Medicine.

2:30 p. m. Demonstration of Student Health Activities in the University of Minnesota.

DR. H. S. DIEHL, Director.

6:30 p. m. Dinner (Hotel Nicollet)

8:00 p. m. Executive Session (Hotel Nicollet)

WEDNESDAY, NOVEMBER 1

The Relation of Certain Factors in the Student's Premedical Record to Success in Medical School.

GEORGE R. MOON, University of Illinois College of Medicine.

The History of Social Case Teaching to Medical Students.

IDA M. CANNON, Chief of the Social Service Department of the Massachusetts General Hospital.

Bedside Teaching of Medicine

1. REGINALD FITZ, Harvard University Medical School.
2. MAURICE PINCOFFS, University of Maryland School of Medicine.

Study of Accomplishment of Students in High School, College and Medical School.

F. S. RANDLES, Albany Medical College.

Problems of the Lowest Third of the Student Body

R. M. STRONG, Loyola University School of Medicine.

NOTE: The delegates will leave Rochester for Minneapolis by special train on Monday evening, immediately after the dinner.

All passenger associations have allowed a rate of a fare and a third with stop-over privileges for the meeting.

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The 1933 Meeting

The forty-fourth annual meeting of the Association of American Medical Colleges will be held October 30 and 31 and November 1, 1933.

The first day's session (Monday) will be held in Rochester, Minnesota. The meeting place will be Plummer Hall on the fourteenth floor of the Mayo Clinic building. Headquarters will be the Kahler Hotel. Registrations should be made at the place of meeting.

The second and third sessions, Tuesday and Wednesday, respectively, will be held in Minneapolis on the campus of the University of Minnesota. Here the Hotel Nicollet will be headquarters.

The executive session will be held Tuesday evening in the Hotel Nicollet.

The program for the meeting is printed elsewhere in this issue.

A cordial invitation to attend the meeting is extended to everyone who is interested in medical education and teaching.

The various passenger associations have granted a fare and a third rate, with stop-over privileges, to the meeting. Certificates will be mailed to the deans later and to anyone else who wishes to attend. They must be presented at point of departure when railroad ticket is purchased.

◆ ◆

American Medical Students in Great Britain

Word has been received from the General Medical Council of Great Britain that of the 114 American students who applied for admission to the medical schools of Great Britain during the year 1932, twenty-four (24) of the twenty-eight (28) accepted were in attendance during the session of 1932-1933.

That is a much smaller number than attended these schools during the 1931-1932 session as previously reported by the Council on Medical Education and Hospitals of the American Medical Association.

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American Students in Belgian Medical Schools

The C. B. R. Educational Foundation, which was established by the Commission for Relief in Belgium, has ascertained the attitude of the principal Belgian medical schools toward the acceptance of American students. They are not favorably inclined toward the idea; in fact, they are, in the main, averse to accepting such students. Liege will not accept any American students. Brussels and Gand will accept only such students as are acceptable by American medical schools. Louvain was not heard from at the time of going to press.

The diplomas issued to foreigners by the Belgian schools do not in any case confer the right to practice in that country.

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American Students in French Medical Schools

Through the courtesy of the American University Union information as to the number of American students in French faculties of medicine for the school year 1932-1933 has been secured.

It will be noted that this list is not nearly as large as has generally been

supposed to be the case. Foreign students cannot secure the state diploma in France unless they are citizens of France, and only the state diploma gives permission to practice medicine in France. All others than citizens receive the so-called university diploma which is the equivalent of our own diploma inasmuch as it does not confer the right to practice but is, in nearly all states, the basis for a licensing examination.

Of the seventeen faculties of medicine in France only nine had American students last year. None were registered in the universities of Alger, Besancon, Caen, Clermont, Grenoble, Lille, Poitiers and Rennes.

Eighty-seven Americans were registered in the remaining seven faculties, as follows: Aix-en-Provence, 2; Bordeaux, 4; Dijon, Strasbourg and Toulouse, 1 in each; Lyon, 4; Montpellier, 12; Nancy, 3; Paris, 59.

◆ ◆

Legal Education

The Council on Legal Education of the American Bar Association has published a pamphlet in which is presented a comparative study of medical and legal education. Whereas medical schools have decreased in number in the last twenty-five years, law schools have increased about 85 per cent, from 102 to 185, of which only 82 schools are approved.

New admissions to law schools in 1932 exceeded medical school admissions by more than 50 per cent, or 9,340 as against about 6,200. In 1930 the total attendance in the law schools was 46,751 against 21,597 in the medical schools.

The total number of lawyers in the United States is about 175,000 as against 155,000 physicians, an increase of about 60 per cent for the lawyers and 19 per cent for the physicians in thirty years.

In 1932, 19,470 persons attempted to pass the bar examinations in the various states. Only 45 per cent passed, 9 per cent less than in 1928. However, it is stated that repeated trials by unsuccessful candidates have resulted in nine out of every ten finally being admitted to the bar. Applicants who took the bar examinations in 1922, 1923 and 1924 have been traced to January, 1932, in six states. Ninety-two per cent were finally admitted to the bar.

Only nineteen states require two years of college education or its equivalent for candidates for the bar, and in only 14 of these the requirement is preliminary to law study.

Hawaii is the only jurisdiction which has the requirement of graduation from a law school approved by the American Bar Association as preliminary to taking the examination for admission to the bar.

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False Statement by Applicant

Dr. C. C. Bass, dean of Tulane University of Louisiana School of Medicine, reports that one Philip Sidney Fisher, of Albany, Georgia, stated on his application for admission to Tulane that he had not attended any other medical school. Inquiry elicited the fact that he had attended the Medical Department of the University of Georgia, session of 1932-1933 and that his record was unsatisfactory.

The files of this Association show that the applicant was dropped by the Georgia school for poor scholarship. His premedical work was done in the University of Georgia, Athens.

College News

University of Texas Medical Department

A collection of the late Dr. N. N. Allen, an early professor of surgery at the state medical college at Galveston, was recently presented to the institution by the physician's daughter, Mrs. George Osborne, Hempstead. The collection, which includes books, photographs and letters, will be used in writing a history of the college and of medicine during the early days of Texas, newspapers reported. Dr. Allen served as professor of surgery at the medical school both while it was a part of Soule College of Chapel Hill and after it became a part of the University of Texas.

◆ ◆

University of Indiana School of Medicine

Plans of the state department of child health and maternal welfare, which is now under the supervision of the medical school, have been announced. Dr. Oscar N. Torian, professor of pediatrics at the university, as chairman of child health on the advisory committee recently appointed, has appointed a chairman for each medical district in the state to cooperate in the promotion of child health. Two measures already approved in the program of education are graduate teaching and lectures to child health organizations. Committees under the jurisdiction of Dr. Torian will study, develop plans and make recommendations for the following divisions of work: graduate teaching, immunization, the preschool child, the school child, child health and welfare organizations, and tuberculosis. All plans must be submitted to the university committee for approval. Active programs for the division of maternal welfare, of which Dr. Arthur M. Mendenhall is chairman, and the dental division are in process of formation.

A two weeks intensive graduate course for physicians was given during July. The attendance of 67 exceeded expectation.

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University of Tennessee College of Medicine

The sum of $1,044.87 has been received as a bequest from the late Dr. Max Goltman, a former professor of surgery, to be used as a student loan fund, to be known as the Goltman Memorial Fund.

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University of Chicago Division of Biological Sciences

Promotions: Dr. Percival Bailey, a concurrent appointment as professor of neurology in the department of medicine; Dr. William Bloom, associate professor of anatomy; Dr. Alexander Brunschwig, assistant professor of surgery and also assistant professor of roentgenology; Dr. Paul C. Bucy, assistant professor of neurosurgery; Dr. Vernon R. DeYoung, assistant in pediatrics; Dr. Charles B. Huggins, associate professor of surgery; Dr. Hilger P. Jenkins, assistant professor of surgery; Dr. John R. Lindsay, associate professor of otolaryngology; Dr. Henry B. Perlman, instructor in surgery; Dr. Gordon H. Scott, assistant professor of otolaryngology; Dr. John T. Stough, instructor in ophthalmology; Dr. Theodore E. Walsh, assistant professor of otolaryngology.

◆ ◆

Creighton University School of Medicine

New appointments: Dr. Augustus G. Pohlman, former dean of the University of South Dakota School of Medicine, pro-

fessor and head of the department of anatomy; Drs. George K. Fair, Charles J. Fogarty, William J. Egan and William M. Dendinger, assistants in medicine, and John E. Courtney, assistant in surgery.

Promotions: Dr. James F. Kelly, professor of roentgenology and head of the department; Dr. Arthur C. Johnson, assistant professor of surgery; Dr. John F. Gardiner, assistant professor of medicine; Dr. William H. Schmitz, assistant professor of urology; Drs. Norman H. Atwood and Edward S. Maloney, instructors in medicine; Dr. Maynard M. Greenberg, instructor in ophthalmology; Dr. Clarence S. Moran, instructor in pathology; Drs. Leo P. Coakley and Frederic M. Watke, instructors in otorhinolaryngology.

A portrait of the late Dr. Hermann von W. Schulte, dean of the medical school from 1917 till his death in 1932, was presented to the university by the medical faculty.

◆ ◆

Washington University School of Medicine

A grant of $58,500 has been received from the Rockefeller Foundation toward the expense of conducting a five year research project in the physiology of the nervous system. The investigations will be made in the laboratories of the new Oscar Johnson Institute for Research chiefly by George H. Bishop, professor of applied physiology in ophthalmology, and Samuel Howard Bartley, research fellow in applied physiology in ophthalmology.

◆ ◆

Temple University School of Medicine

Faculty appointments: Adolph Noonberg, professor of psychoanalysis; Oliver S. English, clinical professor of psychiatry; Meyer Corff, clinical assistant in junior surgery, and Herman V. Garfield, clinical assistant in genito-urinary diseases.

The degree of doctor of medicine was conferred on 112 candidates, the largest class to graduate from the school.

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Columbia University College of Physicians and Surgeons

Dr. Bernard Sachs has been appointed professor of clinical neurology and Dr. Harry Aranow clinical professor of obstetrics. Dr. I. Ogden Woodruff has been promoted to professor of clinical medicine.

◆ ◆

Baylor University College of Medicine

An oil painting of Dr. Walter H. Moursand, dean, was presented to the college by the graduating class of 1933.

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University of California Medical School

Promotions: E. L. Bruck and E. S. Du Bray, to associate clinical professor of medicine; M. Gerstle, to assistant clinical professor of neurology; T. H. McGavack, to professor of homeopathic materia medica; H. W. Fleming and A. R. Kilgore, to associate clinical professor of surgery; C. L. Callander, to associate clinical professor of surgery and topographical anatomy; F. S. Foote and S. H. Mentzer, to assistant clinical professor of surgery; C. M. Johnson, to assistant clinical professor of urology; F. W. Allen, to instructor in biochemistry; S. T. Pope and F. J. Rochex, to instructor in medicine; C. T. Hayden, to instructor in obstetrics and gynecology; L. Goldman, to instructor in surgery.

The following will be on leave of absence during the academic year 1933-1934: J. H. Woolsey, associate clinical professor of surgery; S. V. Larkey, librarian of the Medical School Library and assistant professor of medical history and bibliography; H. F. Blum, as-

sistant professor of physiology; L. S. Mace, assistant clinical professor of medicine.

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New York University University and Bellevue Hospital Medical College

Departmental changes and appointments:

The Chair of Surgery was named in honor of the late Dr. Stewart, who for nineteen years had been professor of surgery, the George David Stewart Professorship, and Dr. Arthur M. Wright was appointed the first incumbent of the new chair.

A department of Forensic Medicine was established with the following staff: Dr. Charles Norris, professor of forensic medicine; Dr. Alexander Gettler, professor of toxicology; Dr. Douglas Symmers, professor of gross pathology; Dr. Harrison S. Martland, associate professor of forensic medicine; Dr. Thomas A. Gonzales, assistant professor of forensic medicine; and Dr. Armin V. St. George, assistant professor of gross pathology.

Six lectures dealing with the relationship between the physician and the medical examiner's office, and other medicolegal topics will be given all fourth year students. The main instruction in forensic medicine, however, will be in the form of elective courses and in graduate work. Through Dr. Norris and his staff, the department has the facilities of the office of the Chief Medical Examiner of the City of New York, and through Dr. Martland, is linked with the office of the Chief Medical Examiner of Essex County, N. J.

Dr. William C. Lusk, for thirty years professor of clinical surgery, was made professor emeritus of clinical surgery.

Following the retirement of Dr. Leon T. LeWald to the inactive list of the medical faculty, Dr. I. Seth Hirsch was appointed professor of roentgenology.

Changes in title: Samuel Brock, associate professor of neurology; Milton Levy, assistant professor of chemistry; Frederic Wertham, assistant professor of psychiatry; Samuel Bernard Wortis, assistant professor of neurology.

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University of Pennsylvania

Plans for coordination of the medical and dental schools of the university have been announced by President Gates. A comprehensive knowledge of medicine will be required of dental students in the future. Study in medical clinics and laboratories will be required. The arrangement includes the assumption by the professor of medicine of a chair of the same name in the dental faculty. It ensures the integration of medical courses in the dental curriculum and their supervision by interested authorities.

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University of Mississippi School of Medicine

A substantial increase in the budget has been granted by the Board of Trustees for the school year 1933-1934. The budget amounts to $32,000. The dean has been authorized to add to the teaching personnel. A mail vote of the legislators was favorable to granting an appropriation of $75,000 to rehabilitate the medical school and to secure needed new equipment. The Board was unanimous in voting to continue the school and to make such changes as will merit approval by evaluating agencies.

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Marquette University School of Medicine

Dr. Eben J. Carey, director of the medical exhibits at the Chicago Century of Progress exposition and professor of anatomy at Marquette university since 1920, has been named dean of the Marquette school of medicine.

Dr. Carey succeeds Dr. Bernard F. McGrath, who resigned because of ill health after serving five years as dean.

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Duke University School of Medicine

Appointments, effective Oct. 1, 1933: Dr. Frederic M. Hanes, of Winston-Salem, N. C., professor of medicine in the School of Medicine and head of the department of medicine in the hospital, succeeding Dr. H. L. Amoss. Dr. Hanes was graduated with the A.B. degree from the University of North Carolina in 1903; received the A.M. degree from Harvard University in 1904, and the degree of M.D. from the Johns Hopkins University School of Medicine in 1908. He was associate professor of pathology at Columbia University for three years, and associate professor of medicine at Washington University for one year. He has been connected with the Presbyterian Hospital in New York, the Rockefeller Institute, and Queen's Square Hospital, London.

In addition to the above, twelve new appointments have been made to the resident staff of the hospital.

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University of Michigan Medical School

Faculty promotions: James Hoyt Maxwell to assistant professor of physiology; Carleton Barnhart Peirce to associate professor of roentgenology; Francis Bruce Fralick to associate professor of ophthalmology.

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Western Reserve University School of Medicine

The school of medicine announces award of Crile Foundation Fellowships, established several years ago by Dr. George W. Crile, formerly professor of surgery of the school, to enable promising students to do research during vacation months, as follows:

George Henry Gerlach, Eugene J. Stanton and Irvine H. Marshall, in the department of pharmacology; George Robert Krause, Harold Victor Morley and Theodore S. Rosen, department of anatomy; William Francis Ashe, Harry Edward King and Miss Genevieve Delfs, department of biochemistry; Ben Fisher and Miss Sarah Mathiott Kindman, department of hygiene; Donald Alanson Kelly, Robert Douglas Mansfield and Mary Ruth Oldt, department of pathology; Aladar Edgar Maks, department of histology; Kenton Robinson Phelps, department of physiology.

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Medical College of Virginia

Dr. Daniel D. Talley has been appointed professor of roentgenology, succeeding the late Dr. Alfred L. Gray.

Dr. J. L. McElroy, superintendent of the hospital division since 1929, has resigned to become director of the American Hospital, Paris, France.

Dr. Lewis E. Jarrett, senior assistant superintendent of the hospital division, has been promoted to succeed Dr. McElroy.

Other faculty promotions:

W. R. Bond, from associate professor to professor of physiology; H. B. Haag from associate professor to professor of pharmacology; R. H. Courtney from assistant professor to associate professor of ophthalmology; Wyndham B. Blanton from associate professor to professor of the history of medicine.

Personals

Dr. Harry M. Zimmerman, assistant professor of pathology in Yale University School of Medicine, has been promoted to a professorship.

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Dr. Louis E. Phaneuf, professor of gynecology in Tufts College School of Medicine, was recently granted the degree of doctor of science by Tufts College.

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Dr. William B. Castle, assistant professor of medicine in Harvard University Medical School, was given the honorary degree of master of science by Yale University.

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Dr. Haven Emerson, professor of public health practice in DeLamar Institute of Public Health, Columbia University, has been elected a corresponding member of the Academy of Athens, Greece.

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Dr. Ludvig Hektoen, for the past 32 years professor and head of the department of pathology in the University of Chicago, Division of Biological Sciences, retired recently having the age of 70.

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Dr. A. Richard Bliss, Jr., chief of the division of pharmacology in the College of Medicine of the University of Tennessee since 1923, has resigned to devote his time to scientific investigation and research as the director of the Research Laboratories of the Wm. A. Webster Company, Memphis.

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Dr. Robert A. Moore, instructor in pathology in Western Reserve University School of Medicine, resigned to become assistant professor of pathology in Cornell University College of Medicine.

Dr. V. E. Henderson, professor of pharmacology in the University of Toronto, has been elected an honorary member of the Kaiserliche Leopold Carolinische Akademie der Naturforscher.

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Dr. Lawrence T. Post was recently appointed head of the department of ophthalmology of Washington University School of Medicine.

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Dr. Daniel P. Hickling, professor of clinical psychiatry at Georgetown University Medical School, was recently retired as alienist for the district government, a position he has held for many years.

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Dr. Harry J. Gondolf has returned to the school of medicine of the University of Mississippi as professor and head of the department of pathology and bacteriology.

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Dr. Beryl I. Burns, professor of anatomy in the Louisiana State University Medical Center, was awarded the degree of Ph.D. by Northwestern University, Evanston, Ill., on completion of his research done in the Institute of Neurologic Research of which Dr. S. W. Ranson is director.

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Dr. James R. McCord, professor of obstetrics in Emory University School of Medicine, will conduct a postgraduate course in obstetrics in the state of Alabama, beginning September 25.

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Dr. W. F. R. Phillips, professor of anatomy in the medical college of the state of South Carolina since 1914, has returned to his former home in Washington, D. C., for an indefinite period.

General News

Catholic Hospital Association

The following is an excerpt from the resolutions unanimously adopted at the closing meeting of the Catholic Hospital Association of the United States and Canada at its eighteenth annual convention held in Saint Louis, Mo., June 16, 1933:

BE IT RESOLVED, That this Association endorse the principles drafted in the report on Nursing Education of the Association of American Medical Colleges, particularly with reference to the suggestions for the administration of university schools of nursing.

Alphone M. Schwitalla, Pres.

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Graduate Courses in Neurology and Psychiatry

Graduate courses are offered in neurology and psychiatry by Columbia University College of Physicians and Surgeons and cooperating institutes, beginning October 2, 1933. These courses are designed for graduate medical students interested in the many aspects of neurology and psychiatry. In addition to the clinical survey they aim to cover, in part, the sociological and educational fields. These courses are so arranged as to meet the desire of applicants feeling the need of further knowledge in these branches.

The courses consist of lectures, lectures with laboratory work, lectures with demonstrations, laboratory courses, demonstrations and practical clinical courses.

During the first ten weeks of the academic year beginning October 2, 1933, and ending December 8, 1933, there will be a series of courses devoted principally to clinical psychiatry and neurology (the Trimester in Neurology and Psychiatry). Any individual course (except clinical assignments in neurology and psychiatry) may be taken singly.

The sixteen weeks beginning January 22, 1934 and ending May 12, 1934 (Semester in Neuropathology), are devoted entirely to intensive work in neuropathology, the object being to give a fundamental training in this subject. This work is largely under the supervision of the Department of Neuropathology of the Psychiatric Institute and Hospital.

The various conferences scheduled are open to those taking any of the courses without payment of additional fees.

The fees for the individual courses are given in connection with the description of each course. The entire Trimester in Neurology and Psychiatry may be taken for a fee of $200. The total fee for the Semester in Neuropathology is $250, although the lectures in this semester (course Ce30a) may be taken separately for a fee of $100, thus omitting the laboratory practice.

Those who have medical appointments in any of the institutions under the New York State Department of Mental Hygiene may take the Trimester in Neurology and Psychiatry or the Semester in Neuropathology without payment of tuition or registration fees.

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Supervision of Specialists

At a joint conference called in Milwaukee, June 11, 1933, which was attended by physicians representing the boards of examiners in ophthalmology, otolaryngology, and obstetrics and gynecology, the National Board of Medical Examiners, the Association of American Medical Colleges, the American College of Physicians, the Federation of State

Medical Boards, and the Council on Medical Education and Hospitals of the American Medical Association, as well as representatives from the specialties of pediatrics, orthopedics, dermatology, proctology, urology and neuropsychiatry.

In the course of the discussion it was proposed:

1. That the specialty examining boards now operating, and to be established in the future, were the proper agency to determine the qualifications for the different forms of specialized practice.

2. That the National Board of Medical Examiners, through its facilities for practical laboratory and clinical examinations in twenty-one medical centers in the United States, could be of particular service in the conduct of examinations in the specialties.

3. That a representative advisory conference or committee be established to supervise and coordinate the methods of qualification and certification on a uniform and national basis.

A preliminary committee representing the specialties was directed to arrange for a further meeting during the coming winter, probably at the time of the educational congress next February, for permanent organization and more definite determination of purpose. It is felt that this is a distinct step forward towards a conservative supervision of the specialties on a national basis.

New Apparatus

The Central Scientific Company, Chicago, announces the completion of a thermelometer, an electrical clinical thermometer which accurately follows body temperature changes in hyperpyrexia produced by diathermy or other artificial means; the Sheard-Sanford photelometer for quick quantitative determination of the amount of hempglobin in dilute alkaline blood solutions and other new pieces of apparatus in which teachers will be specially interested. Further information will be furnished on request.

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The Bausch and Lomb Optical Company, Rochester, New York, announces the completion of the new Exton junior scopometer used for colorimetric and turbidimetric determinations of all kinds in clinical laboratory work and biochemistry.

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Maine State Board Rules on Foreign Applicants for Registration

The State of Maine Board of Registration in Medicine recently voted that no graduate of a foreign medical school will be admitted to its examinations who cannot prove that he is a graduate of a reputable foreign school, that he has at least taken out his first naturalization papers for citizenship in the United States and that he has a license to practice in the country in which his medical school is located.

Book Reviews

Synopsis of Surgical Anatomy

By Alexander L. McGregor, lecturer on Surgical Anatomy, University of Witwatersrand. William Wood & Company, New York. 1932. Price, $5.

No attempt is made to deal exhaustively with the anatomy of the whole body. The contents of the book are presented as separate essays, any one of which is complete in itself. Part I discusses the anatomy of the normal; Part II, the anatomy of the abnormal. Many pages are devoted to the anatomy of surgical procedures and of surgical approach. The book should make a large appeal to both student and teacher of surgery.

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Introduction to Dermatology

By Norman Walker and G. H. Percival, Edinburgh. Ninth edition. William Wood & Company, New York. 1932. Price, $7.

A reproduction of the senior author's lectures to medical students, describing fully all the more common skin diseases, the rare ones only briefly. The basis of discussion is: anomalies of sensation, pigmentation and secretion, inflammations, new growths and malformations. One hundred beautiful color plates and ninety-two illustrations add much to the well presented text.

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Guide to Human Parasitology

By B. D. Blacklock, professor of Parasitology, Liverpool School of Tropical Medicine, and T. Southwell, lecturer in Helminthology, Liverpool School of Tropical Medicine. The Williams & Wilkins Company, Baltimore. 1932. Price, $4.

This book is not intended for use by the undergraduate student, but he who has in mind a career as a public health officer, will find it extremely useful as a small textbook which will serve as a basis for further study and graduate work.

Instead of overwhelming the student with a mass of new names and anatomical details, emphasis is laid only on the pathogenic organisms. The style is clear and lucid. The tables and illustrations are excellent.

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Physical Chemistry of Living Tissues and Life Processes

By R. Beuttner, professor of Pharmacology, University of Louisville. Williams & Wilkins Company, Baltimore. 1933. Price, $5.

This book was written in order to stimulate thought. The author allays the apprehensions of diffident prospective readers by explaining in the preface that the text can be readily understood by the average medical student. All mathematical treatment of theories has been relegated to the appendix. The subject, and the theories evolved, being lucidly described, prove so fascinating that even the casual book-taster is carried along well towards the appendix.

A key to the book is thoughtfully hung on the title page in the following quotation:

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Diseases of the Skin

By Robert W. MacKenna, late lecturer in Dermatology at the University of Liverpool. Third edition. Revised by Robert M. B. MacKenna. William Wood & Company, Baltimore. 1933. Price, $

Brought up-to-date, with the addition of many well colored plates and other illustrations. The therapeutic appendix should prove popular with students.